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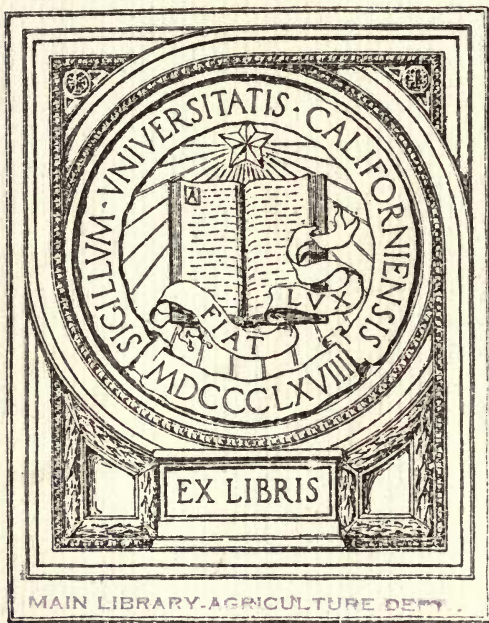
# HARDY FRUIT CULTURE



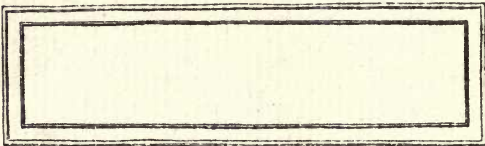
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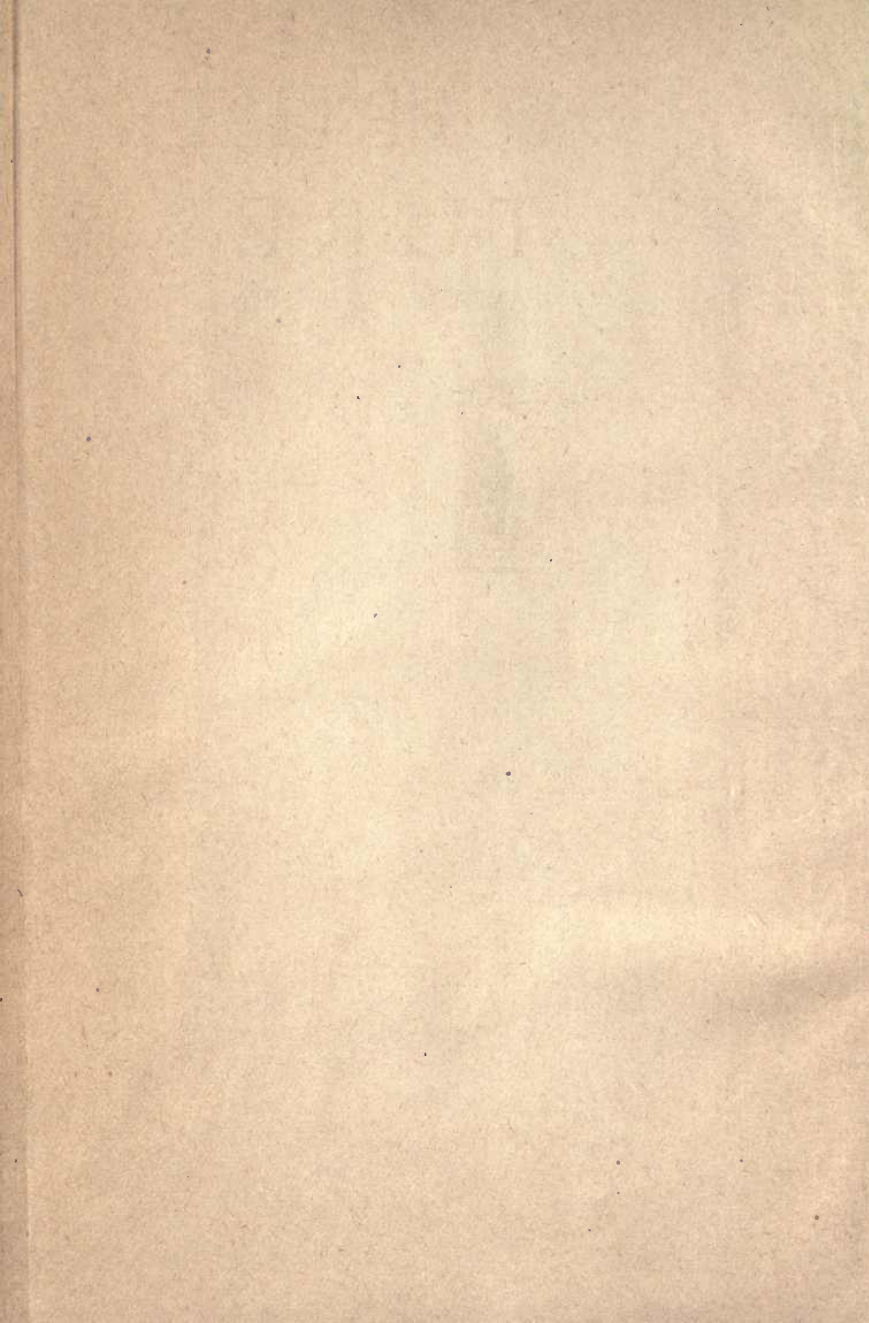


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# HARDY FRUIT CULTURE

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# CONTENTS

	PAGE
TREES FOR SMALL GARDENS . . . .	I
VARIETIES FOR SMALL GARDENS . . . .	6
PLANTING FRUIT TREES . . . . .	12
THE GARDENER'S FRIENDS . . . . .	17
PRUNING AND TRAINING FRUIT TREES . . . .	18
ESTABLISHED FRUIT TREES . . . . .	34
METHODS OF PROPAGATION . . . . .	47
PESTS AND DISEASES OF FRUIT TREES . . . .	65

## APPENDICES.

SPRAYING MACHINES AND THEIR USE . . . .	74
DIRECTIONS AND FORMULÆ FOR PREPARING USEFUL WASHES . . . . .	76
CALENDAR OF OPERATIONS . . . . .	77
INDEX . . . . .	79

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## CHAPTER I.

### *Hardy Fruits.*

#### (A) TREES FOR SMALL GARDENS.

THE term "fruit tree" conjures up, for many people, the image of a great tree with immense spreading branches and wandering roots. "We have no room for fruit trees," they say, and that is the chief reason why many owners of small gardens do not plant fruit trees. Insecurity of tenure provides another reason—the man who hires his garden on a very short lease does not care to plant trees because he is under the impression that he cannot move them if, and when, he gives up the land.

The general belief that fruit trees will not come into bearing until they are ten or twelve years old is another thing which militates against the planting of hardy fruits.

It is time that all this misunderstanding was swept away ; every one should know that *when fruit trees are worked on the right kind of stock*, they will take up very little room in the garden, they will come into bearing within two or three years after grafting and, if necessary, they may be lifted and moved even when they have been growing in the same spot for six or eight years. With respect to the last point, it is necessary under existing laws, to obtain the permission of the landlord before planting trees in hired gardens ; then the trees may be moved when the tenancy expires. Some landlords will themselves



## *Trees for Small Gardens*

provide the trees which a tenant desires to plant and, in that case, they will, of course, be left behind when there is a change of tenant.

So much has been written about the right kind of soil, suitable aspects, etc., that it is possible that people may be afraid to plant on what they consider to be unsuitable soil or in unsuitable situations. It is true that certain soils and situations are better than others, but practical tests have proved that apples, at any rate, will grow on almost any soil and, very often, in what might be called unfavourable situations.

The most important point in making a start is to get the right type of tree on the right kind of stock.

The three best types for small gardens are :—

(i.) The “ Bush ” on a dwarfing stock, (ii.) the “ Cordon ”—of which there are several varieties—on a dwarfing stock, and (iii.) the “ Half-standard ” on the “ free ” stock.

(i.) THE BUSH TYPE.—Apples worked on the Non-such Paradise stock, Pears worked on the Quince, and Plums worked on the Common Plum, may all be grown as “ bushes ” in small gardens.

The open-centred “ bush ” fruit tree is easily trained, but it is not easily obtained from nursery-men. In the trade, a mongrel pyramid often passes for a “ bush.”

To train a real “ bush ” the maiden (one year old) tree is headed back (*i.e.*, cut back) so as to leave four or five well-defined wood buds on the young growth (see Fig. 1). This pruning should be done during the winter, *viz.*, in November or December if the young tree remains in the place where it was grafted or budded, or, alternatively, in February if the tree was



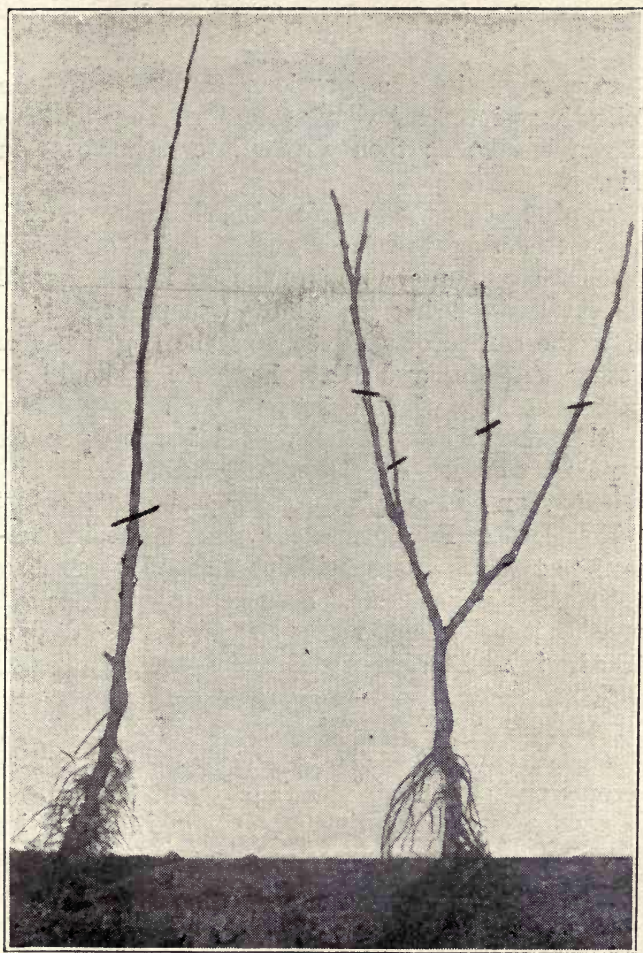


FIG. 1.

FIG. 2.

FIG. 1.—A Maiden Tree, showing the point at which it should be cut back in winter. About five well-developed wood-buds will be left on the tree.

FIG. 2.—A Two-year-old Tree, showing when to cut back the new growth in the following winter.

Note the outward-pointing buds just below the point at which the branches are to be pruned. Photo by W. W. Cockbill.

## *Trees for Small Gardens*

transplanted in the previous October. In the following winter the young tree must be pruned as shown in Fig. 2: then a year later as shown in Fig. 3.

In after years the laterals—*i.e.*, side shoots which are not required to form branches—will be summer pruned (see Chapter IV.) and the leading shoots will be cut back during the winter (see p. 21). Note that the centre of the tree must be kept clear of young growths and that the leaders should be pruned to buds which point outwards.

(ii.) CORDON FRUIT TREES.—This is a very popular type of tree for small gardens, and almost any nurseryman will supply properly trained “Single,” “Double,” or Four-branched Cordons (see illustration, p. 27). Amateurs will do well to plant Cordons rather than “Espaliers,” because the latter type of tree is not easily kept in order by untrained gardeners. The horizontal branches of Espaliers are arranged on different levels, and the topmost branches will, invariably, grow most vigorously whilst the lower branches gradually die back unless they receive proper and continual attention.

Cordons are not so difficult to deal with; the side shoots are summer-pruned (see p. 30) and the leading shoots are pruned back to a bud on alternate sides each year so that the latter are thus made to follow a straight line.

Single cordons are usually planted about 18 inches apart and they are often trained obliquely to a fence—*i.e.*, at an angle of about 45 degrees with the ground level.

(iii.) HALF-STANDARDS.—The half-standard tree has a stem which is about 4 feet in length. Various

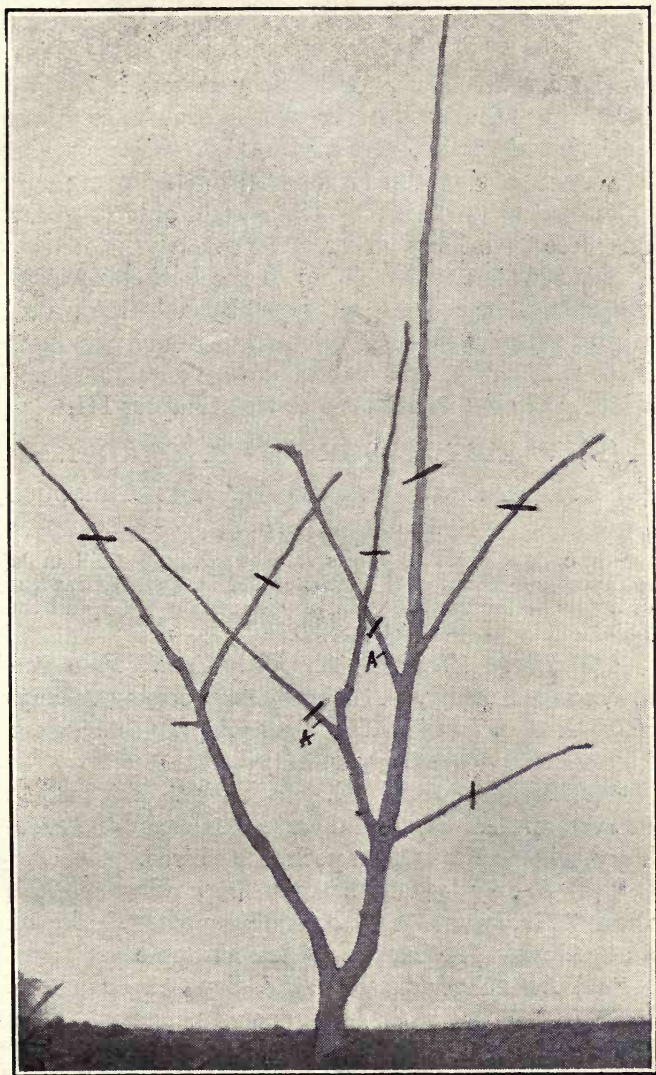


FIG. 3.—A Three-year-old Tree, showing the method of pruning in the following winter. A, A = side-shoots not wanted to form branches, to be cut back to about three buds. Note the outward-pointing buds as in FIG 2. Photo by W. W. Cockbill.



## Varieties for Small Gardens

stocks are used but, for small gardens, it is most important that whatever the stock, only those varieties of apples, pears, plums, or cherries which bear regularly should be selected in this form; and the vigorous growing varieties should only be grown on "free" stocks in larger gardens.

The pruning and training of the half-standard is very much the same as for "bush" trees, viz., winter pruning for the first three or four years as in Figs. 1, 2, and 3, and a combination of summer and winter pruning in after years (see Chapter III.).

### (B) VARIETIES FOR SMALL GARDENS.

#### (i.) BUSH APPLES WORKED ON THE NON-SUCH PARADISE STOCK.

\* a, c, d, e, g, j, l, n, p, q, s, t, u, v, w, x, z, will make an excellent selection if a shorter list is desired, but the complete list of varieties will provide apples nearly all the year round. K. = Kitchen. D. = Dessert.

\* (a) *Early Victoria*. K. July–Aug. Pale yellow, cooks frothily. The best early cooking variety.

(b) *Red Victoria*. K. Aug.–Sept. The most highly-coloured cooking variety.

\* (c) *Mr. Gladstone*. D. July–Aug. The earliest dessert apple. It should be eaten from the tree. Very bright red. Often pecked by birds.

\* (d) *Beauty of Bath*. D. Aug. Firmer flesh than "Gladstone." Beautifully spotted, crimson and yellow. The best early dessert apple.

\* (e) *Lord Suffield*. K. Aug.–Sept. Pale yellow, large, conical and of first-rate cooking quality. Does badly on heavy soils.

(f) *Lord Grosvenor*. K. Sept.–Oct. Similar to the foregoing in season and quality, but will do well on heavy soils.

## *Varieties for Small Gardens*

\* (g) *Duchess of Oldenburg*. K. D. Sept. Pale yellow, handsomely streaked with red. Soon begins to bear even on young trees, but does best on a light soil.

(h) *Ecklinville Seedling*. K. Sept.-Oct. Greenish yellow, flat and dotted with brown spots. Does well on heavy soils.

\* (j) *Worcester Pearmain*. D. Sept. Highly coloured, deep crimson. Seldom fails to bear.

(k) *Stirling Castle*. K. Sept.-Oct. Dwarf grower. Fruit large and round, somewhat flat. Better as a half-standard.

\* (l) *James Grieve*. D. Sept.-Oct. An excellent dessert apple of moderate growth.

(m) *Golden Spire*. K. Sept.-Oct. Conical and straw-coloured.

\* (n) *American Mother*. D. Sept.-Oct. Conical and highly coloured, delicious flavour.

(o) *The Queen*. K. Oct.-Dec. Large fruit, somewhat flat. Good cropper.

\* (p) *Allington Pippin*. D. Oct.-Dec. Similar in shape to Cox's Orange. Crops regularly every year.

\* (q) *Lord Derby*. K. Nov.-Dec. Greenish yellow, large, oblong fruit.

(r) *Bismarck*. K. Nov.-Feb. Very large leaves. A good cropper, but susceptible to "scab."

\* (s) *Gascoyne's Scarlet Seedling*. K. D. Nov.-Feb. Brilliantly coloured red-cheeked apple.

\* (t) *Lane's Prince Albert*. K. Oct.-Jan. Pale green, streaked with red, very large fruit. An excellent regular cropper. Good keeper.

\* (u) *Bramley's Seedling*. K. Dec.-March. Very large fruit, a most valuable cooking variety.

\* (v) *Cox's Orange Pippin*. D. Nov.-Jan.

## *Varieties for Small Gardens*

Richly flavoured, the best late dessert apple. It is self-sterile and must therefore be planted amongst other varieties (see p. 40).

\* (w) *Newton Wonder*. K. Nov.—May. The result of a cross between Blenheim Orange and Normanton Wonder, this variety has most of the good points of both parents. It will keep quite firm and sound until June.

\* (x) *Anna (or Annie) Elizabeth*. K. Mar.—April. Very regular cropper with large firm fruits. It blossoms late and misses the frosts.

(y) *Houblon*. D. Dec.—Jan. Similar to Cox's Orange in shape, but it keeps longer.

\* (z) *Sturmer Pippin*. D. Feb.—June. Good flavour and a prolific bearer.

*Cordon Apples*. Any, or all, of the varieties named above will do well if trained as cordons.

*Half-Standard Apples*. Early Victoria, Mr. Gladstone, Duchess of Oldenburg, Worcester Pearmain, Stirling Castle, Golden Spire, Lane's Prince Albert, Allington Pippin and Cox's Orange may be grown in this form in small gardens, the other varieties are too vigorous when grafted on the crab stock.

### (ii.) BUSH PEARS AND CORDON PEARS WORKED ON THE QUINCE STOCK.

\* A shorter list of ten sorts marked thus.

*Jargonelle*. Aug. Distinct shape, should be gathered before it is quite ripe or the fruits will fall to the ground.

\* *Clapp's Favourite*. Aug.—Sept. Large, pyriform, very handsome with yellow stripes.

\* *Williams' Bon Chrétien (or Christian)*. Aug.—Sept. A well-known variety. Does not keep.



## *Varieties for Small Gardens*

*Hessle (or Hazel)*. Oct. Small fruits, but sweet and juicy. Not of first-rate quality, but abundant.

\* *Fertility*. Sept. A great bearer, very hardy, provides pollen for other sorts which are self-sterile.

*Conference*. Oct. Large, pyriform, good quality.

\* *Pitmaston Duchess*. Oct.–Nov. Very large and juicy. A vigorous grower and must not be too severely winter-pruned.

\* *Durondean*. Nov. Large, handsome fruits, russety bronze in colour and of good quality.

*Doyenne du Comice*. Nov. The best flavoured pear in existence, but sometimes a shy bearer.

\* *Beurre Superfin*. Oct.–Nov. Good cropper, delicious flavour.

\* *Beurre Diel*. Oct.–Nov. Large fruits somewhat roundish in shape. A heavy cropper.

\* *Louise Bonne of Jersey*. Oct. Speckled, handsome fruits.

*Marie Louise*. Oct.–Nov. A delicious pear, but the tree is somewhat tender. It will not do directly on the Quince, but succeeds when double-grafted, *i.e.*, when another variety (*e.g.*, *Beurre d'Amanalis*) is first grafted on the Quince and *Marie Louise* then grafted on the first graft.

\* *Glou Morceau*. Dec.–Jan. A hardy, first-rate dessert pear.

*Catillac*. Dec.–April. An excellent cooking pear.

\* *Easter Beurre*. Jan.–March. An excellent pear.

### (iii.) BUSH PLUMS.

\* A short list of eight sorts marked thus.

\* *Rivers' Early Prolific*. K. D. End of July. Oval, purple fruits. Bears well.

## *Varieties for Small Gardens*

*Early Orleans.* K. Aug. Reddish purple, round fruits. Very hardy.

\* *Czar.* K. D. July-Aug. Large, purple, and very prolific. Upright grower.

\* *Denniston's Superb.* D. Aug. Early "gage."

*Greengage* (original var.). D. End of Aug. A well-known plum.

*Jefferson.* D. Mid-Sept. A golden gage.

\* *Early Transparent Gage.* D. End of Aug. Greenish yellow, spotted red.

\* *Late Transparent Gage.* D. Sept. A good cropper. These two transparent gages should be in every garden.

\* *Monarch.* K. D. End of Sept. Very large fruit and a heavy cropper.

\* *Victoria.* K. D. Sept. Large, pink. A well-known sort which bears heavily, but it is susceptible to Silver-leaf disease.

\* *Coe's Golden Drop.* D. Oct. Golden yellow fruits which keep for some time. Does well on a wall.

Victoria may also be grown as a half-standard.

### (iv.) CHERRIES FOR BUSH CULTURE.

*Empress Eugenie.* End of June. Similar to May Duke, but earlier.

*May Duke.* Early July. Dark red. An abundant bearer.

*Archduke.* Mid-July. Deep red flesh. Good flavour.

*Morello.* July and Aug. Valuable for preserving. Will do well as a trained tree on a north wall.

## Varieties for Small Gardens



FIG. 4.—Part of a row of Half-Standard Apples (2 specimens shown in photograph), planted 16 ft. apart with Black Currants between and with Narcissus Bulbs (planted 12 ins. deep) along the same line. The fruit buds on the trees were just bursting when the photograph was taken. The Apples were nine years old, and they yielded very heavy crops. Note the grease bands on the trunks of the Apple Trees.



## CHAPTER II.

### *Planting Fruit Trees.*

THE fruit plot must be well prepared, and free from weeds before any planting is done. In dealing with a piece of land which has been badly cultivated, or possibly under grass for some years, it is worth while to postpone the planting for one year, and, after bastard trenching the land in autumn and winter, to plant the plot with main-crop potatoes for one season. The hoeing, earthing-up, and lifting of the potato crop together with the weed-smothering effect of the potato foliage, will leave the land clean and in excellent condition for planting in the following autumn.

#### THE BEST TIME TO PLANT.

Fruit trees should be planted during dry weather in the month of October whilst the soil retains some of the summer heat. This enables the trees to produce a quantity of small rootlets before cold weather sets in, so that, in the following spring, the trees may start into growth without any check ; but if the planting is delayed until the soil is cold and wet, the consequent check to the growth will leave its mark on the trees for some time.

Planting is often done in spring when the weather is suitable, but this entails either pruning at the same time as planting or else the putting off of the pruning until the following winter, and experience teaches us that this is bad practice.

# Planting Fruit Trees

## DISTANCE APART.

No hard and fast rule can be given as to the best distances between the trees ; the habit of the tree—*i.e.*, whether vigorous or otherwise—the character of the soil, and, above all, the type of the tree must be taken into account. If those points are kept in mind, the following table may be taken as a guide :—

Standards with stems of 6 feet :—24 feet to 30 feet apart.

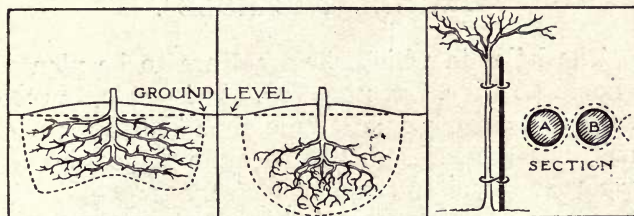


FIG. 5.

Diagram showing a tree properly spread and properly covered. Note mound-shape of soil at the bottom of the hole.

Diagram showing roots of a tree planted badly. The roots are twisted and cramped, and the tree is planted too deeply.

Two figure-of-eightties on a standard tree, and sectional diagram showing figure-of-eight tie as dotted line. A, The tree. B, The stake.

Half-standards with stems of 4 feet :—15 feet to 20 feet apart.

Bush trees on dwarfing stocks :—10 feet to 12 feet apart.

Bush fruit proper, such as gooseberries and currants :—4 or 5 feet apart and 5 or 6 feet between the rows.

For commercial purposes, permanent plantations are usually made up of a mixture of standards and dwarf trees, with bush fruit between. In the small hired garden the trees to be planted should

## *Planting Fruit Trees*

be chiefly of the dwarf type, as they will give quick returns ; they occupy little room, and they may be kept well within the reach of the grower for pruning, spraying, gathering, etc.

One or two half-standard apples might very well be included on fairly large plots, but ten or twelve trees of the "bush" type would be sufficient to commence with on smaller plots, cordons—raised at home—being added later on.

### MAKING THE HOLES.

The holes in which the trees are to be planted should be wide, but not deep. It is seldom necessary to take out much more than the top spit of soil, but the holes should be quite  $2\frac{1}{2}$  feet across, wide enough, at any rate, to allow for the roots of the tree to be spread out at full length from the centre of the hole.

Dung should not be placed under the tree nor in contact with the roots ; in fact, it is better not to feed the trees with nitrogenous manures until they begin to bear.

A stake should be driven in the centre of each hole *before the tree is planted* ; there will be then no damaged roots, as there would be if the stake is put in after planting, and, moreover, if the stakes are in a straight line, the trees will also be in line, provided that each tree is placed on the same side of the stakes.

The S.W. side of the stake is usually chosen because the prevailing winds blow from this direction and the tree placed thus will not be blown away from the stake.



## *Planting Fruit Trees*

A very strong stake is required for standard trees, but a lighter one may be used for a dwarf tree, as in this case no support is necessary after the first year.



FIG. 6.—*Planting Bush Plum. Showing how the upper roots must be held up till the lower ones are covered.*

*Photograph by P. H. Alder-Barrett.*

### TRIMMING THE ROOTS.

The roots of each tree must be examined before planting ; bruised or damaged portions must be cut off, and any long roots which are bare of fibre should be shortened back. A sharp knife should be used, and the roots cut straight across. No notice should be taken of the advice—often given in books—to

## *Planting Fruit Trees*

make the cut on the upper side or on the lower side of the root.

### PLANTING.

The actual operation of planting must be done by at least two persons, one to hold the tree and spread the roots, and another to shovel in the soil.

The lower roots are spread first, whilst the others are held well up around the stem and out of the way until the lower roots are covered with soil ; then a few more roots are spread out and covered, and so on until the hole is filled.

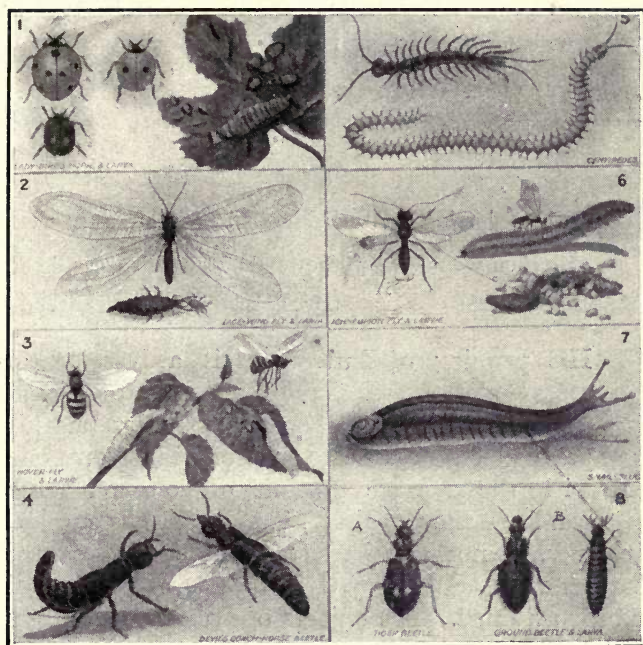
As stated above, the holes should not be made very deep ; there is usually a mark on the stem which shows how deep the tree was planted in the nursery, and that may be taken as a guide ; it may be noted also that the topmost fibry roots should be about 2 inches beneath the ground-level after the tree is planted. (See Fig. 5.)

Tarred yarn may be used to tie the tree to the stake, and a figure-of-eight tie (see Fig. 5) will hold the tree firmly. Standard trees may need tying in two places—*i.e.*, near the top of the stake and near the ground-level.

The soil must be made very firm by treading or by ramming after planting, but care must be taken not to damage the roots. A mulch of leaf-mould, bracken, or decayed material from the compost heap may be given after planting, to protect the topmost roots from frost, but dung should not be used except on very poor soil, and even then the dung should be well decayed.

On very heavy soils trees may be planted almost on the top of the ground, soil being heaped up around the roots and extra stakes provided.

# Planting Fruit Trees



## THE GARDENER'S FRIENDS.

FIG. 7.—1. Lady-Birds, Pupæ and Larvæ. 2. Lacewing Fly and Larvæ. 3. Hover Fly and Larvæ. 4. Devil's Coach-Horse Beetle. 5. Centipedes. 6. Ichneumon Fly and Larvæ. 7. Snail-Slug. 8A. Tiger Beetle. 8B. Ground Beetle and Larvæ.



## CHAPTER III.

### *The Pruning and Training of Fruit Trees.*

“When piercing cold had burst the brittle stone,  
He then would prune the tender’st of his trees.”

*From Addison’s translation of  
Virgil’s Fourth “Georgic.”*

THE pruning of fruit trees is a bugbear to amateurs, and I have known professional gardeners who were somewhat shaky on this particular point. As a matter of fact any one with the average amount of common sense can learn the principles, but the actual practice, however, is not acquired so easily, and years of patient work must be put in before any degree of skill is attained. The objects of pruning are briefly as follows :—

1. To admit light and air to all parts of the tree.
2. To encourage the formation of fruit buds.
3. To train and shape the tree so that the branches do not cross and rub against each other.
4. (When dealing with dwarf trees) to keep the tree within reasonable limits so that fruit-thinning, fruit picking, pruning and spraying may be easily performed without the aid of a ladder.

Properly pruned trees produce finer fruit than unpruned trees, and more fruit also if the space occupied is taken into account. Unpruned trees produce fruit as a rule only at the extreme ends of the branches, and when there is any fruit near the

## *Pruning and Training*

centre of the tree it is very inferior, small and un-ripened.

The same principles must be applied whatever the kind of tree, but the actual method of pruning differs in each case. This is chiefly because the fruit buds are sometimes produced on the young wood and sometimes on the older wood. In cutting away wood to admit light and air it is obvious that the wood which bears the fruit buds must be left.

Beginners should first learn to distinguish between fruit buds and wood buds.

### WINTER PRUNING.

A sharp knife should be used for winter pruning hard-wooded trees, such as apple and pear trees. I do not know of any make of secateurs or pruning shears which will make a clean cut. Instruments of this kind bruise the bark before actually cutting the wood, and a dead ring of bark remains. Cuts like this do not heal quickly, rot sets in, and this is difficult to arrest once it gets started. Canker fungus and Woolly Aphis (American blight) also readily obtain a hold in such places as these.

A sharp knife leaves a clean cut which heals quickly. Then again it is not possible to cut close to a bud with secateurs, and therefore, later on, a dead piece of wood about an inch long will be found where the cut was made.

### THE PRUNING OF "BUSH" APPLES AND PEARS.

In both cases the fruit buds will be found chiefly on the wood which is more than one year old. These buds may be easily distinguished from wood buds, as they are much larger than the latter both

## *Pruning and Training*

on apple and pear trees. As the young wood does not possess fruit buds it is, evidently, the wood which should be cut out to admit light and air. Young "maidens" are usually shortened hard back in the first year to induce a bushy habit, and the weaker varieties should be cut further back than strong-growing sorts; but in any case quite two-thirds of the length of each shoot should be cut away.

In the second year the young leading shoots should be shortened by about one-half their length. That is to say, if the shoot possesses twenty buds, ten will remain after pruning, and so on. As a rule we cut back all leading shoots to a bud *pointing in an outward direction*, so that next year's leader will grow outwards instead of towards the centre of the tree. We aim at keeping the centre open, and any young shoots which tend to fill up the middle should be removed altogether. (See also Chapter I.)

The young side shoots (or laterals) should be shortened back to three "eyes" (or buds) to form fruiting spurs, and after the third year I prefer to do most of this spur pruning during the summer. This refers also to the side shoots on cordons, espaliers, and all dwarf-trained apples, pears, plums, red currants and gooseberries.

The winter pruning of apples may be commenced as soon as the leaves have fallen, but I prefer to leave pear trees till later so as to delay the flowering period. Pears, if pruned early, will flower early, and consequently much of the bloom will be destroyed by frost. If the trees are pruned as described above, regularly year by year, the whole business is fairly simple, but when they are neglected for several years the treatment is altogether different and more



## Pruning and Training

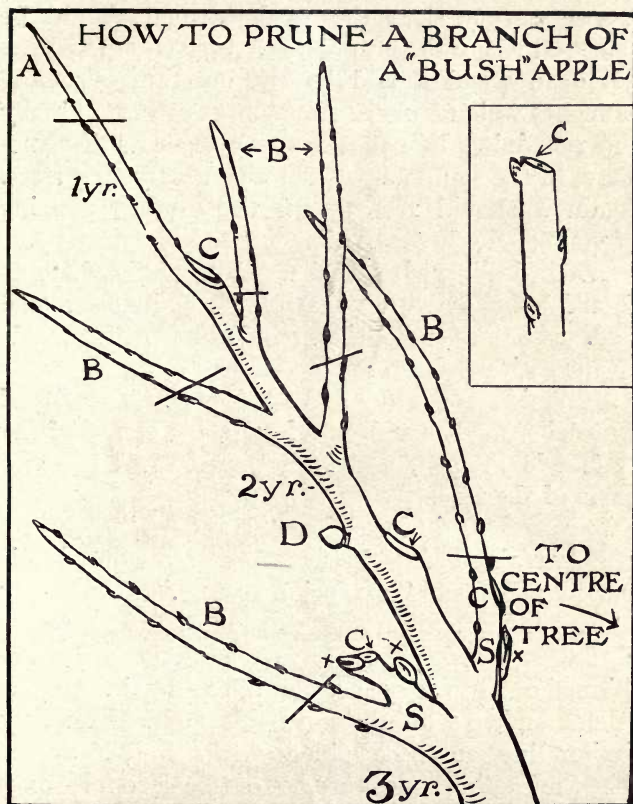


FIG. 8.—A = Leading shoot or "leader" (one year old with wood buds); B = Laterals or side shoots (same age). C = Scars from previous pruning (three year). D = A fruit bud on the two-year wood. S = Fruit spurs on the three-year-old wood with fruit buds marked x. Winter pruning: leader pruned to an outward bud; laterals on two-year wood back to three buds; laterals from spurs back to one or two buds. (In subsequent years laterals should be pruned in summer.)

complicated. In the latter case we first aim at opening up the centre by removing whole branches

## *Pruning and Training*

if necessary; then the weaker wood should be removed where the branches are very close together. All dead wood should be cut out, and also any branches which cross or rub against others. Finally the remaining branches may be dealt with something in the same way as described for young trees. Again I should recommend the summer pruning of young side shoots in after years.

When dealing with hard wood in winter the cuts should be made with a sharp knife and close to the bud. If a saw is used, the wound must be afterwards cleaned with a sharp knife.

Pyramids are seldom planted now. The dwarf "bush" type is usually preferred, the centre of the bush is kept open, and fruit may be had from all parts of the tree.

It may be said here that "standard" trees are usually trained after the first three years on what is usually called the "extension system." The young leaders and laterals are not shortened, but the centre of the tree is kept open, and weak branches are thinned out annually to admit light and air. On the other hand, we often train half-standards on very similar lines to those laid down for bushes except that the leading shoots are not cut back so far—only by one-third at the most.

### PLUMS.

The same principles which apply to pruning "bush" apples and pears should also be applied in dealing with plums, except that the pruning should not be quite so severe. Excellent fruit is produced on two-year-old wood, and this fact must be kept in mind. Summer pruning is absolutely

## *Pruning and Training*

essential, for plum trees will make too much wood if they are continually winter pruned.

Secateurs may be used for gooseberries, rasp-

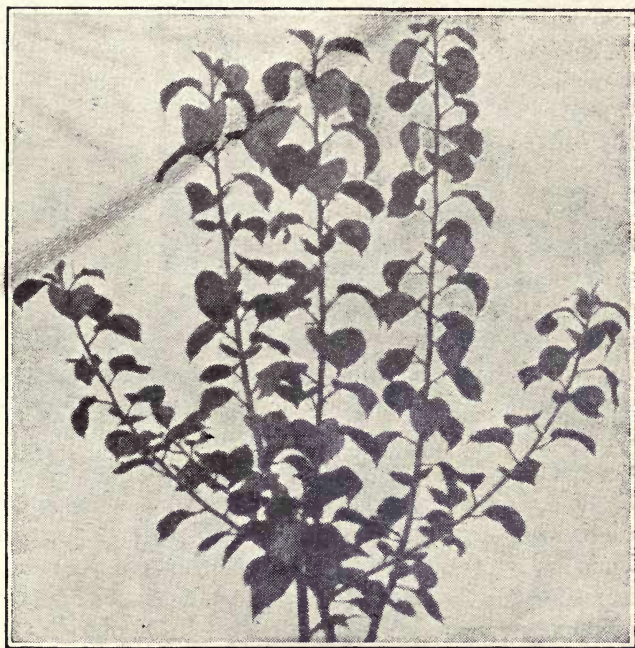


FIG. 9.—*Bush Apple in its second year. (Raised by the Author.) Photo by P. H. Alder-Barrett.*

berries, and roses, but as explained above I do not like them for hard wood.

### CHERRIES.

Cherries do not require much pruning once the young tree is formed, a thinning out of the weakest branches being all that is necessary.

This thinning should be done while the tree is in



## Pruning and Training

leaf and as soon as possible after the fruit is gathered.

Morello cherries fruit on the wood produced in the previous year, and they should be treated like peaches, *i.e.*, the old wood is thinned out, and replaced by young shoots when the trees are trained on fences or walls. When grown as bushes, however, they may also be left unpruned as advised for the other cherries.

### CURRENTS.

The pruning of white and of red currents is practically the same as described for "bush" apples and pears. The *young* growth is shortened back, the side shoots to three buds, and the leading shoots to a bud pointing in an outward direction. The pruning of the side shoots may be done during the summer, but the leading shoots should be left till autumn as a rule. The removal of whole branches is sometimes necessary, particularly when the bushes have been neglected for a year or two. The centre of the bush should be kept quite open. The fruit buds are produced chiefly on the older wood, especially at the base of the young shoots. They are similar to wood buds, and beginners should learn to recognise them before commencing to prune.

The pruning of black currents is altogether different. The fruit is produced on the young wood, and the *oldest* wood is cut out to admit light and air. Black currents are not as a rule pruned hard enough. The old wood should be ruthlessly sacrificed to make room for strong young shoots. Sucker growths from below the ground should be encouraged, as the finest fruit is often produced on wood of this kind. For this reason, too, the buds are not

## *Pruning and Training*

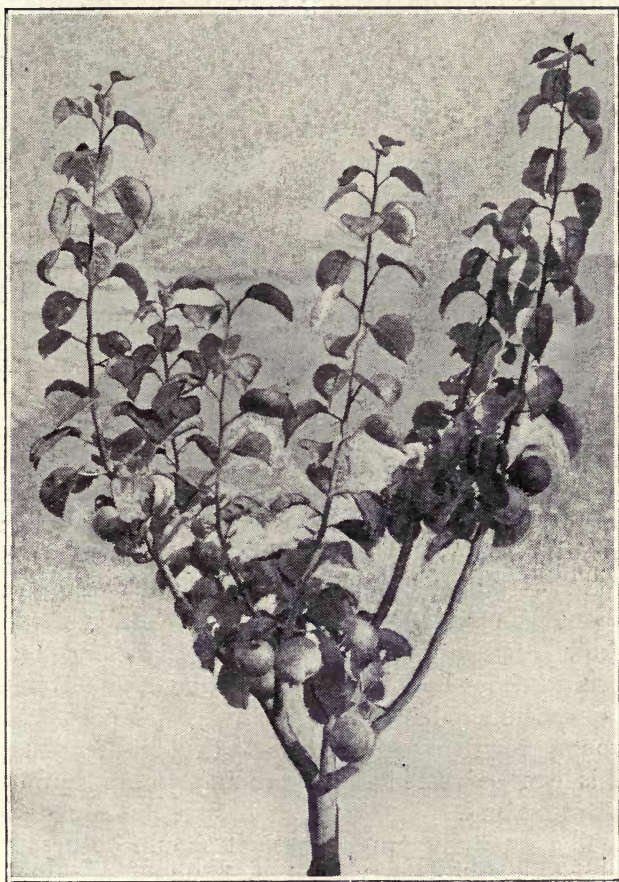


FIG. 10.—*Three-year-old Bush Apple. (Raised by the Author.) Note the open centre. Photo by W. W. Cockbill.*

removed from black currant cuttings. “Suckers” are not wanted in red and white currants, and the buds are usually removed from that portion of the

## *Pruning and Training*

cutting which goes below ground. Black currants, when well grown, are the most profitable of all fruits, and they pay well for regular attention and proper pruning.

I know of one large grower who plants black currant bushes 2 feet apart in the rows, instead of the usual 4 feet, and every other bush is cut down in alternate years. The plantation is on heavy land, the manuring is heavy also, and "mite" is unknown.

### GOOSEBERRIES AND RASPBERRIES.

The gooseberry produces the finest fruit on two-year-old wood, and this determines the pruning. First of all the centre of the bush should be cleared, then the weakest of the young growth should be cut out, and the remaining strong young shoots should be thinned out if necessary. Finally the young shoots which remain should be shortened back, but not too severely; about one-third at the most should be cut off. Next year's "leaders" will grow in whatever direction the end bud on a pruned shoot happens to be pointing, and this must be remembered in dealing with gooseberries. The young growth in some cases has a drooping tendency; this can be remedied by pruning to an upward-pointing bud.

In a properly pruned bush it should be possible to insert the hand downwards between any of the branches without difficulty.

The pruning of gooseberries should be done as early as possible in the autumn, and all prunings should be burnt to prevent the spreading of American Gooseberry Mildew. (See page 72.)

Raspberries and allied fruits such as the logan-



## Pruning and Training



FIG. 11. — *Two-year-old Bush Plum. Height, 2 feet 6 inches. (Note the open centre.)*

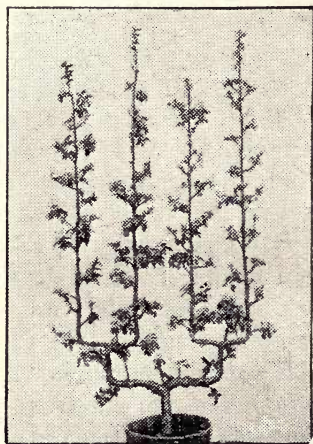


FIG. 12. — *Fruit Tree trained as Four-branched Double U Cordon. (Block lent by Messrs. Laxton Bros., Bedford.)*



FIG. 13. — *Young Apple Tree trained as Single Cordon. (Lent by Messrs. Laxton Bros., Bedford.)*

## *Pruning and Training*

berry should not be pruned in autumn or winter, and this is a common mistake in garden practice.

The fruit is produced on the young one-year old canes, and these should be completely cut out immediately after the fruit is gathered.

The weakest of the new canes should also be removed, leaving about four or five to each plant, and these should not be touched until March in the following year. The unripe tips can then be removed and injury by frost is thus avoided. The wood of roses and raspberries is very pithy, wet is quickly absorbed at the cut end, and if the pruning is done in winter "Jack Frost" will often prune back much farther than is desirable. Use secateurs for both gooseberries and raspberries.

### WOUNDS AND BROKEN BRANCHES.

These hints on Winter Pruning would not be complete without a reference to the dangerous practice of leaving ragged wounds and broken branches on fruit trees.

Silver-leaf disease, Canker fungus, Coral-spot and Woolly Aphis may all find a home in such places.

Wounds should be trimmed with the help of a sharp knife and then dressed with coal tar.

A saw with wide-set teeth is generally used to cut out big broken branches or branches which are not required, and these saw cuts should also be trimmed and tarred. Note also that a small saw cut should first be made on the under-side of large branches which are to be removed, otherwise the weight of the branch will carry it down when the cut made from the upper side is nearly through, stripping the bark from the stem of the tree and thus making a nasty wound.

# Pruning and Training

## SUMMER PRUNING.

The main objects of summer pruning are :—

1. To induce the tree to form fruit buds on spurs in a safe position quite near to the branches.
2. To admit sunshine and air to all parts of the tree at a time when it is most likely to do good, *i.e.*, in the summer.
3. To check or to prevent excessive growth and to keep the tree well balanced and true to a desired shape.

Excessive *winter* pruning always leads to excessive growth.

Beginners find this very difficult to understand, but the explanation is simple enough. The sap descends in the autumn and sufficient is stored in the main stem and larger roots of the tree to provide sufficient nourishment next spring for *all* the buds on the tree.

Now suppose that we cut away one-third or even one-half of the total number of buds ; the sap, intended for all, will enable the remainder to develop much quicker when the time comes, and the result is seen in the vigorous growth and lengthy shoots on such a tree.

This does not happen if the pruning is done when the sap is flowing full and strong.

There are many different systems, but only three will be dealt with here. The system commonly practised in English gardens is simple enough, but it does not always give satisfactory results, possibly because it is sometimes done at the wrong time. The average English gardener shortens to within five or six leaves of their base the side shoots or



## Pruning and Training

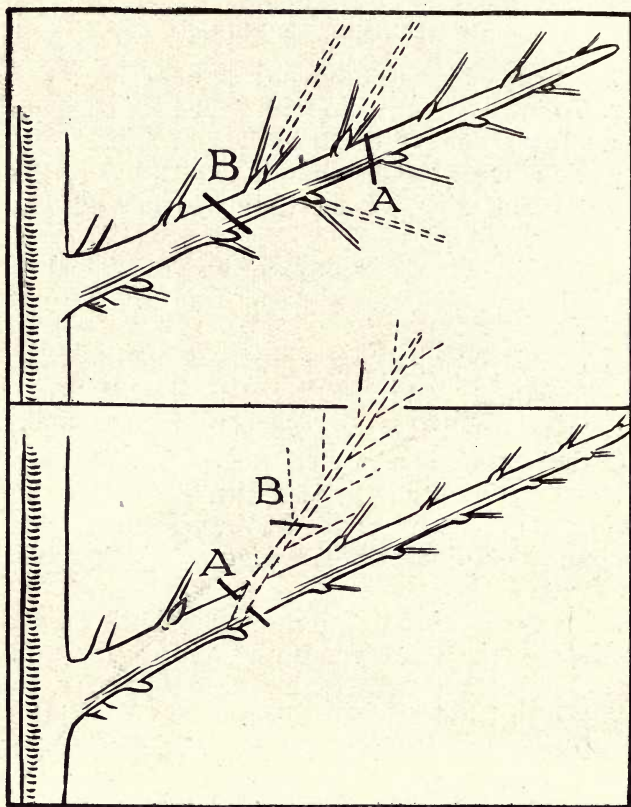


FIG. 14.—*Summer Pruning.* Diagrams showing how to Summer Prune the Side-shoots of Apples, Pears, Plums, Red Currants and White Currants. Dotted lines show secondary growths. First system (page 29): A, Where to prune in July; B, Where to prune in the following winter. Second system: A, Where to prune in May-June; B, Where to prune in July-August.

laterals of apples, pears, red currants and white currants late in July or early in August, then in

## *Pruning and Training*

winter these side shoots are again cut back to within two or three buds. The leading shoots are not summer pruned.

A second system—taught at Swanley twenty-four years ago—is quite different. The side shoots are shortened to three buds late in May or early in June, and any shoots which arise from these buds will be cut back to one, or perhaps two buds late in July or in August ; a third cutting back may be necessary if new shoots arise from the latter buds in the same year.

Under a third system —Lorette's—no winter pruning is done. The leaders are shortened in April or May and the side shoots (laterals) during the summer when they are about 10 inches long and fairly firm or woody at the point where they are pruned. So that in a normal year the pruning of the laterals would thus commence at the end of May or early in June, and it is continued throughout the summer just as, and when, the laterals and sub-laterals (secondary growths) reach the stage described above. Under this system the exact point at which the lateral is pruned varies considerably according to the character of each shoot. A novice could not undertake the work, as some experience is necessary to enable a gardener to judge just where to cut. Briefly stated, it may be said that there are three possibilities: (1) Young laterals, possessing wood buds only, will be cut right back to a point just above the cluster or crown of leaflets which is to be found just at the base of the shoot, care being taken not to damage these leaves, for the idea is to develop fruit buds from the stipulary "eyes" in the axils of such leaves. (2) Shoots which

## *Pruning and Training*

possess a small fruit bud at the base are cut back so as to leave one good wood bud which makes, later on, a sub-lateral or secondary shoot. (3) Stronger shoots with a fruit bud as (2) and possessing also about eight or ten good wood buds are shortened so as to leave three of the latter, all of which will probably make secondary shoots.

Later on in July or August the three sub-laterals from the (3) shoots will be reduced to one, and this is cut away, as also are all other secondary shoots, in September, so that finally there are no young growths to cut back in winter.

M. Lorette trains young trees on the same system right from the beginning, using the young shoots obtained from stipulary "eyes" to form the branches. Secateurs should be used in all three of the above systems of summer pruning.

### ROOT PRUNING.

This is only necessary when a tree is making a lot of wood and producing no fruit. Roots cut by the spade should be cut again with a sharp knife, if possible. To reach the roots right under the stem I have often screwed an old chisel to a long stake and probed with this until these roots were severed. The operation entails labour and should only be done as a last resort. (See also page 46.)

A tourniquet made of wire fixed tightly round the stem of a too vigorous tree is sometimes employed to check the flow of sap and to induce the tree to bear fruit. Iron bands are also used for this purpose. Wounded bark, however, often lets in Silver-leaf, Canker, etc., and this should be kept in mind if these methods are practised.



# Pruning and Training

## DISBUDDING PEACHES.

The peach produces fruit on the young wood, and the illustration shows how to disbud the growth on the bearing shoots.

*a.* New growths disbudded, *i.e.*, removed as soon as the tree breaks into growth.

*b.* Young leading shoot which is shortened back, leaving 3 good leaves as shown; it then serves as a sap drawer, bringing the sap up to the fruit.

*c.* A young shoot which is left to develop and ripen so as to form a bearing shoot for the next year. The old shoot will be cut away after it has served its purpose.

*x.* Fruit which is left to mature. The other fruit will be removed as soon as it is certain that those marked *x* are safe.

N.B.—The disbudding of the shoots and the thinning of the fruits should be done gradually, not all at one time.

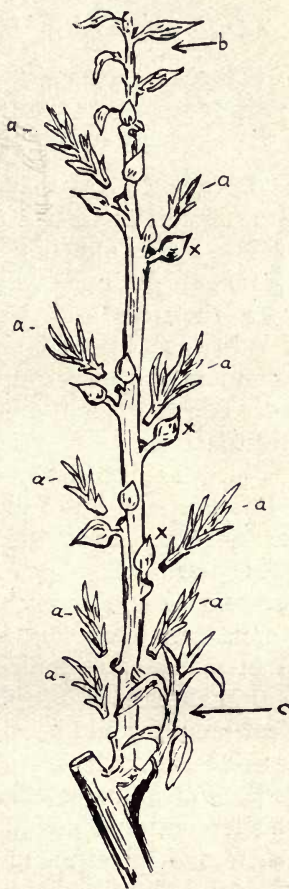


FIG. 15.—Disbudding Peaches.

## CHAPTER IV.

### *How to Deal with Established Fruit Trees.*

#### MULCHING FRUIT TREES.

**A**DRESSING of manure on top of the ground around fruit trees is usually applied in November. This mulching serves two different purposes. It is one way of applying nourishment to the trees, and it also protects the valuable fibry roots from damage by frosts. The latter function is the more important one. Fibry roots are feeding roots, and damage to these means loss of fruit later on.

As already mentioned, manure is generally used for this purpose, but I maintain that this is a mistake in some cases. Raspberries, black currants, apples, pears, and plums which are bearing heavily each year should receive a good dressing of dung at mulching time, but for young, growing trees, and in many cases for red currants, I should not use animal manure. In fact, plain peat moss litter or leaf mould would be much more suitable for any trees or bushes which are likely to make too much wood. Animal manures are usually rich in nitrogen, and the continual use of nitrogenous manures for fruit trees often results in a luxuriant growth of leaf and stem. That is one reason why young fruit trees so often fail to bear, and the drastic remedy of root pruning has to be applied.

The mulch should be applied if possible whilst

## *Established Fruit Trees*

the soil is fairly dry. Old trees which bear heavily require plenty of manure, and they seldom get it. A newly-planted tree is often a "spoilt child," overfed and unruly, whilst the faithful old trees are neglected and starved.

It is quite impossible to over-manure raspberries and black currants, for the fruit is produced on young wood.

Fresh or "hot" manure should not be placed against the bark. A protecting "collar" of soil should first be drawn up around the tree with a hoe, and this will prevent any damage to the bark.

### FEEDING.

Fruit trees *in bearing* do not as a rule receive sufficient attention in the way of manuring. Many trees only produce fruit in alternate years for this reason, and growers should remember that the fruit buds for next season will suffer unless extra food is given to trees carrying a heavy crop of fruit. In such cases three applications of manure will be necessary each year.

During July, when apples and pears are carrying heavy crops, the land around the roots should be thoroughly soaked with diluted liquid manure from cowsheds or stables. This should be done after rain, if possible, or, in a dry season after a previous soaking with plain water. The main object of this particular feeding is to plump up the fruit buds which are being formed for the next year.

The annual mulching should follow in November, as described above.

The third feeding should be given in early spring, when artificial manures should be applied as a top-



## *Established Fruit Trees*

dressing. I cannot give particulars of a general mixture for fruit trees, for so much depends on the nature of the soil, the age, kind, and condition of the trees, etc., and special advice is necessary in each case. I can, however, give a few hints which may be useful. No harm can be done by applying phosphatic and potassic manures such as superphosphate and sulphate of potash. Both of these supply very necessary foods, the lack of which often means much trouble with diseases such as silver leaf, canker, scab, mildew, etc. On the other hand, an overdose in early spring of nitrate of soda, sulphate of ammonia, or of other nitrogenous manures may do a lot of harm. I prefer to wait and see how the blossom sets before giving manures which stimulate the growth of leaf and stem. This applies particularly to young trees.

### WINTER SPRAYING.

Insect pests are always less numerous when the bark is clean. Moss, lichen, and green mould all provide shelter and breeding places for insects, but when the bark is clean and healthy the pests are easily seen by birds, washed off by rain, or in some cases destroyed by frosts.

Fungus diseases may also be checked by spraying.

Our forefathers annually cleansed the bark with lime. Limewash was applied to the stems and large branches with a brush, and slaked lime was scattered amongst the smaller branches and twigs on a damp morning. This certainly did a lot of good, but the method was so laborious that the custom eventually died out. Modern growers use a proper lime-washing machine, which does the work in less time,

## *Established Fruit Trees*

and which drives the lime into the crevices in the bark. The following mixture is very useful :—

Formula: Quicklime, 3 to 6 lbs. ; flowers of sulphur, 3 lbs. ; salt, 3 lbs. ; caustic soda, 1 lb. ; water, 10 gallons.

Preparation: Mix the soda and lime together and slake with some hot water to which the sulphur has been added, then add extra water to make 10 gallons.

The amount of caustic soda may be increased up to 2 lbs. for old trees which are very dirty.

An alternative mixture, and one which is much used by large fruit growers, is the Woburn wash. This should be made as follows: Dissolve  $1\frac{1}{2}$  lbs. of copper sulphate in about 9 gallons of water, using a wooden tub. Slake about 1 lb. of lime in a bucket and add this to the solution in the tub through a fine sieve or piece of sacking, then add 5 pints of paraffin, beating the mixture well together ; finally add from 1 to 2 lbs. of caustic soda and more water to make 10 gallons.

Either of the above mixtures will reduce the number of pests and prevent the spread of diseases.

The pests are in their weakest state in early spring ; the eggs especially can only be destroyed at that time of year, when they are about to hatch, and for this reason we leave the “ winter ” spraying as late as we dare. As soon as the buds burst, spraying with caustic soda washes must cease. Choose a calm, fine day for the operation, and take care that the mixture does not get on the hands, face, or clothes. Mid-February is usually the most suitable time.

## *Established Fruit Trees*

### WHY TREES FAIL TO BEAR FRUIT.

The chief causes of sterility together with suggested remedies are :—



FIG. 16.—(Top). *Silver Leaf of Fruit Trees*. Winter (fruiting) form of the fungus on dead plum branch. The spores spread rapidly from these growths. (Bottom left) *Silver Leaf of Plum*. Healthy branch on right; diseased branch on left (summer form of disease). To illustrate Part II., Chapter II. (Bottom right) *Silver Leaf of Fruit Tree* (winter form of fungus on dead plum branch). (Photographs by J. J. Green, B.Sc., and the Author.)

1. Climatic. Damage by frosts and by cold winds. In these cases the selection of suitable kinds and



## *Established Fruit Trees*

varieties for exposed positions will do much to prevent disappointment. There are many ways of providing shelter from cold winds, but these are fairly well known, and need not be dealt with here.

2. Imperfect pollination. Many varieties of apples, pears and plums are self-sterile, which means that they require pollen from another variety to "set" the blossoms. Fruit is usually lacking when "Cox's Orange" (apple) or "William's Bon Chrétien" (pear) are planted in isolated positions with no varieties in the immediate vicinity, both being self-sterile. Regular crops of fruit may be obtained by planting certain varieties somewhere near the sterile trees. "Bramley's Seedling" (apple) will give excellent results with "Cox's Orange," and "Fertility" (pear) will provide pollen for the "Bon Chrétien." Strange to say, the pollen of the latter although useless in its own case will "set" the blossoms and give good fruit on "Fertility." Many other instances of this peculiar fact might be given, but space is limited. Fruit growers will realise how necessary bees are in orchards and plantations. Amateurs possessing only a few trees could make the pollination of self-sterile kinds certain with a rabbit's tail tied to a stick, carrying the right pollen in this way to the blossoms which need it.

3. Lack of an essential soil constituent, such as lime. Apples, pears, and the "stone" fruits especially, require plenty of lime. The wood ripens earlier, and the fruit buds are more robust when the soil is rich in lime. With the "stone" fruits it often happens that much of the fruit is lost during the "stoning" period owing to the lack of lime. Slaked lime should be applied, where necessary, in early

## *Established Fruit Trees*

spring at the rate of 8 cwts. per acre, or about 4 ounces per square yard. Trees making vigorous wood growth and producing little fruit will benefit immensely by an application of lime.

4. Excessive winter pruning and wrong manuring are two prolific and common causes of sterility in young trees. (See previous notes on "Summer Pruning," "Root Pruning," and "Mulching.")

### REGRAFTING OLD FRUIT TREES.

In many gardens there are some big fruit trees which are practically useless. These trees take up a lot of room, remove much food and moisture from the soil, and in return produce either nothing at all or some scrubby little fruits which are hardly worth gathering.

This lack of decent fruit is generally due to self-sterility or imperfect pollination, to diseases of one kind or another, or it may be simply because the variety is a worthless one. Many people in the old days used to raise trees from the "pips" or seed, and these seldom produce fruit worth having.

Trees of this kind, if otherwise healthy, may be grafted with scions of a better sort. March is the time to prepare trees for this operation. Trees attacked by Canker, or by Silver-leaf disease, should never be regrafted.

The branches should be cut right back. Three or four limbs should be retained at about equal distances apart, and these should be cut back to a point about 2 feet from the main stem. Other branches should be cut out altogether, especially those in the centre of the tree.

## *Established Fruit Trees*

Crown-grafting is the method employed, and there are several variations of this. We practise what is known as rind-grafting, and this is described and illustrated in the chapter on PROPAGATION, Fig. 19. I do not like cleft or wedge grafting, as the wounds take a long time in healing, and the wet gets in, causing rot later on.

It is the layer of cells known as the cambium which joins, and as this is just under the bark there is really no necessity to cut into the wood when inserting the scions.

Scions should be selected from a strong growing variety ; young wood of last year's growth must be used, and care should be taken to get these from healthy trees.

For re-grafting pears I prefer to have scions from " Pitmaston Duchess," and from " Bramley's Seedling " for apples.

Plums and " stone " fruit generally will not stand the severe cutting back which is necessary for this purpose, but I have seen cherries in Kent regrafted much higher up, almost on the ends of the branches, in fact.

The actual grafting should be done about a fortnight after cutting back the tree. The whole operation is simple and easy to do.

Mixtures consisting chiefly of clay are not of much use to exclude the air from the wounds on big trees ; grafting wax is better and small pots of this can be obtained from any seedsman. I often use " Plastine," which is clean to handle and not much more expensive than wax.

Whatever the material used, it must be removed when the young grafts have made a good start, and



## *Established Fruit Trees*

the tie should be cut, or the swelling bark will be badly damaged.

### “BIG BUD” DISEASE OF BLACK CURRANTS.

Normal healthy buds on black currants are conical in shape, but when attacked by the currant gall mite (*Eriophyses ribis*) the buds are somewhat globular and more or less swollen. A diseased bud may contain thousands of mites, but to the naked eye they are almost invisible, appearing as a fine white powder. The abnormal growth is caused by the mites biting the tissue of the bud. They extract the juices, and the buds attacked seldom produce any fruit.

In some districts fruit growers have given up the cultivation of black currants on account of this disease, but the high price obtained for this fruit in recent years has encouraged others to plant healthy stock and to take precautions to prevent infection. Old bushes which are very badly attacked should be dug up and burnt at once, but it is worth while to adopt remedial measures in the case of young stock which is not badly diseased. Bushes which are underfed and wrongly pruned always suffer badly from this pest. These facts should be kept in mind.

A few years ago the life-history of the mite was practically unknown, and hand-picking the swollen buds was thought to be the only possible method of dealing with the pest. We now know that the mites leave the buds and they may be found outside during spring and early summer. Following this discovery many remedies were tried with varying success. Dusting the bushes with a mixture con-

## *Established Fruit Trees*

sisting of one part lime and three parts flowers of sulphur was found to be efficacious. Spraying the bushes with various washes has also been successful, and I prefer this method to the former, as it occupies less time. Paraffin emulsion and quassia extract may be used either separately or together, and one grower in Northants, whose trees were at one time almost useless, recently informed me by letter: "We had a very good crop of currants from the trees which you treated."

Examine the buds from mid-February onwards. The treatment, whether "wet" or "dry," should commence when the mites begin to leave the buds, and this usually happens in March, but the time varies, of course, according to the locality and to the mildness of the season.

I find that three sprayings—with intervals of a fortnight—are really necessary when the mites are plentiful. Winter spraying with either of the washes mentioned above is well worth while, as it will be easier to deal with the mites on clean bark during the summer.

Some varieties are attacked worse than others. "Baldwin's Black" suffers most, and "Boskoop Giant" least of all. In propagating, only clean, healthy cuttings should be used, and Pickering recommends immersing these in water at 115° Fahrenheit for ten minutes before planting.

Finally, regular pruning and a plentiful supply of manure will do much towards keeping bushes immune from attacks, and, if the directions given above are properly carried out, growers will find that it is still possible to produce paying crops of black currants.

## Established Fruit Trees

### GREASE BANDING.

This process is employed by fruit growers to trap wingless female moths, such as the Winter Moth (*Cheimatobia brumata*). These insects, being wingless, must climb the trees during autumn and winter



FIG. 17.—*Bush Apple*, in its third year, showing fibrous roots of the “paradise” stock and the point at which the stock was grafted. (Block lent by Messrs. Laxton Bros., Bedford.)

for the purpose of laying eggs. One moth may lay from 200 to 300 eggs, and a large proportion of these will eventually become destructive caterpillars. I have seen apple trees entirely defoliated by the “looper” caterpillars of the Winter Moth.



## *Established Fruit Trees*

Other moths which can be trapped in this way are the Mottled Umber, which climbs the trees from the end of October to early February, and the March Moth, which goes up later on from mid-February to mid-April. The Winter Moth females appear as early as the beginning of October, and for this reason the bands should be fixed quite early in that month.

The bands should be made of grease-proof paper, and should be tied round the trees so that nothing can crawl between paper and bark. The proper height from the ground at which to fix the bands is from 1 foot to 2 feet. The width of the band will depend on the material used. In Leaflet No. 4 (Board of Agriculture) the width is given as from 6 to 7 inches for cart grease, but narrower bands can be used when the more modern "tangle foot" preparations are employed. There are several kinds of these on the market, and I believe the stuff chiefly consists of glucose and resin. It resembles the material used on the sticky fly-papers.

If cart grease is used, three applications will be necessary during the winter, as it is likely to dry after a time, but the "tangle foot" preparations remain tacky till spring. In the case of young trees some grease, or tangle foot, should be smeared round the stakes also. Some growers apply the tangle foot directly on to the bark of old trees, but I should not care to do this if the trees are young.

Grease banding is of no use in dealing with Lackey moths, Figure-of-eight moths, Gold-tail and Brown-tail moths, Little Ermine moths, and Tortrix moths, as the females of all these are winged.

The bands should be in working order from

## *Established Fruit Trees*

October 1st until mid-January for winter moths, and when the Mottled Umber and March moths are present the period extends to May.

### ROOT PRUNING.

This operation should not be done periodically as in the case of branch pruning. It often happens that mistakes in manuring—such as an overdose of nitrogenous manure—may cause a fruit tree to make very vigorous growth, and excessive winter pruning of the branches may also have the same effect. Then the tree seems to produce much wood and very little fruit. In such cases root pruning is often resorted to for the purpose of checking the excessive growth. A circular trench 2 feet wide and 2 feet deep is first dug out around the tree, then the operator begins to delve under the soil—which is left attached to the smaller roots—in the endeavour to sever some of the long roots, sometimes miscalled tap-roots, which are usually to be found striking deeply down into the soil directly under such a tree. The trench is marked out with the help of a piece of string, one end of which is tied to the tree and the other to a wooden label or pointed stick; with this stick in his hand the operator simply walks round the tree marking out a circle on the soil with the stick as he goes. The inner side of this trench should be at least 2 feet from the trunk of the tree, and it is usually made in two halves, one half being made and filled in before the other half is started. (See also page 32.)

## CHAPTER V.

### *Methods of Propagation.*

#### GRAFTING.

“And thorns ennobled now to bear a plumb.”

*Addison's translation of Virgil's  
“Fourth Georgic.”*

**I**T appears from the above quotation that grafting was practised in Virgil's time, and this method of propagation is still employed in nurseries, chiefly for raising fruit trees and certain ornamental trees out-of-doors, and also under glass, for roses grown in pots.

REASONS FOR GRAFTING.—Grafting is employed when, for one reason or another, neither seedlings, cuttings, nor layers can be relied upon.

The seedlings of certain plants, *e.g.*, apple, pear and plum, are usually quite unlike and much inferior to the parents; over 90 per cent. of such seedlings will produce fruits which are practically worthless, and the majority will not produce any fruit at all for the first ten—or possibly twenty—years of their growth.

Propagating by cuttings or by layering is useless when plants do not grow vigorously on their own roots.

Experience has shown that the stocks which are used for grafting will exercise a certain influence on the growth of the grafted tree, *e.g.*, dwarf trees may be produced by grafting apples on “paradise” stocks, pears on quince stocks, etc., whereas, apples



## *Propagation*

grafted on the crab, and pears on wild pear, will all make very big trees.

Thus the chief reasons for grafting are: (1) to save time, and (2) to produce a number of trees or plants which will possess a desired character or characters.

STOCKS.—Stocks for the apple are: (1) paradise stocks—of which there are very many different varieties. The broad-leaved English paradise gives strong and vigorous trees, the “Non-such” paradise gives medium trees, and the French paradise has an extremely dwarfing effect on the grafts; (2) wild crab, which makes big trees and is chiefly used for standards; and (3) seedling apples grown from the “pips,” of which it may be said that the thorny ones resemble the crab, and the thornless, fibry-rooted ones resemble paradise stocks.

Stocks for the pear are: (1) quince for dwarf trees and (2) wild pear for standards. Whitethorn and mountain ash have been used also for pears.

For the plum we have many stocks, including common plum, mussel plum, Brompton plum, myrobella plum and several others. The common plum is best for “bush” plums. Plums, and almonds also are employed for peaches and nectarines, whilst wild cherry and mahaleb are used for cherries.

Stocks should be planted in the autumn as advised for fruit trees in Chapter II.

WHEN TO GRAFT.—The stocks should be grafted about eighteen months after planting, but when planted early in October, they are sometimes worked at the end of six months.

April is generally the best month for grafting, but everything depends on the season.

The operation may be successfully performed in

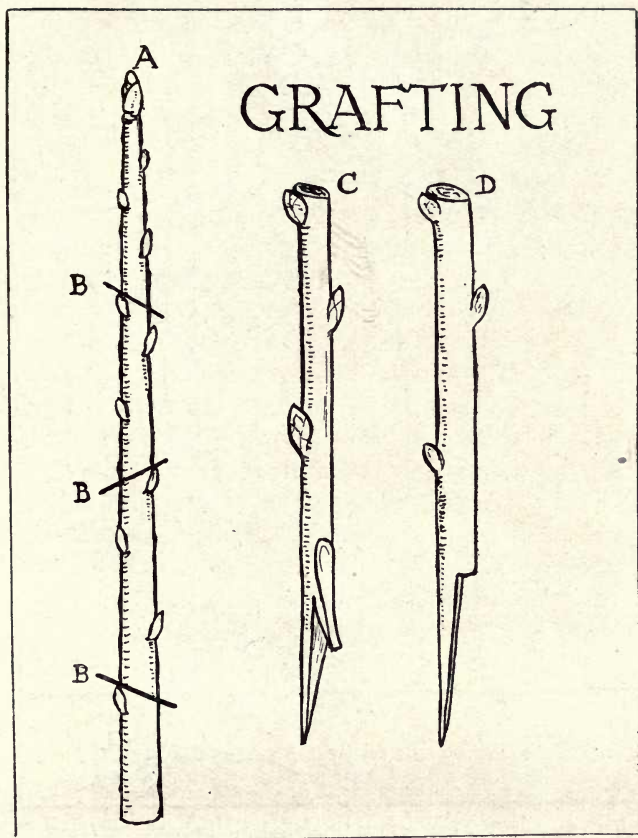


FIG. 18.—(A) How to prepare the scions. Ripe young shoot from cultivated apple showing (B) Where to cut for scions. The unripe tip of the shoot A should be discarded. (C) A scion prepared for Whip Grafting. (D) A scion prepared for Crown Grafting.

March in some years and in May when the season is a late one. The best thing to do is to watch the buds on the stocks, and graft when the buds begin

## Propagation

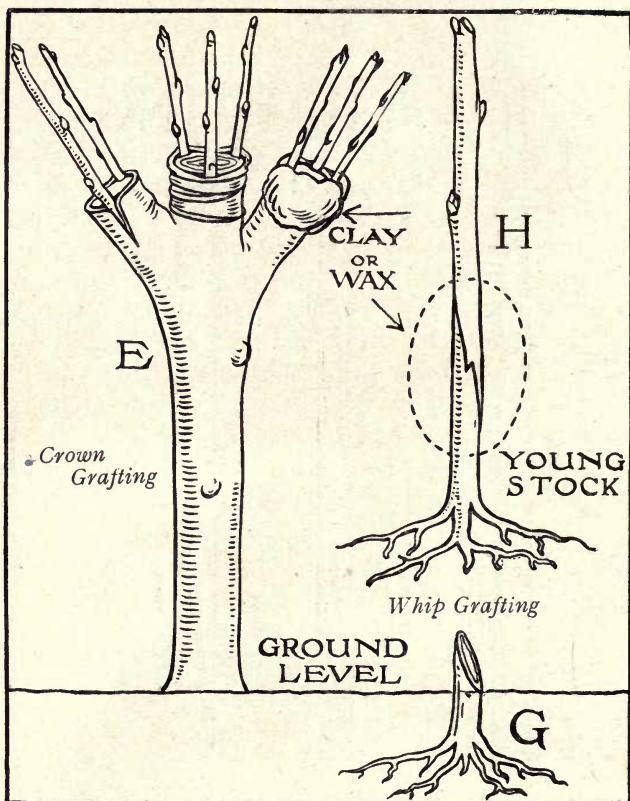


FIG. 19.—(E) Two scions inserted in branch on the left. Three scions inserted and tied in middle branch. Three scions inserted, tied in and clayed up on right-hand side. (G) Young stock cut back ready for grafting. (H) Young stock and scion whip-grafted together.

to burst. “A forward stock and a dormant scion” is a good rule.

**SCIONS.**—The scion is the portion of young wood taken from the tree which is to be propagated.

Well-ripened shoots of the previous year's growth



## Propagation

should be cut from the tree in January or early in February, labelled, and tied in bundles, then placed with the cut ends buried in the soil in a shady position.

THE OPERATION.—There are many methods of grafting, but only two which are really worth knowing, *i.e.*, whip-grafting, and crown-grafting; the former for raising young trees and the latter for renovating old ones.

Figs. 18 and 19 explain both of these methods. Note (1) that a very sharp knife must be used; (2) that dwarf trees should be grafted close to, or even beneath, the soil level and (3) that the grafts must be securely tied in and the wound covered with clay, grafting wax, plasticine or similar material. The tie should be severed when the young grafts possess shoots 2 or 3 inches long, and then they should be supported by light stakes to prevent the wind from blowing them apart from the stocks. (See Appendix II. for Grafting Wax.)

## BUDDING.

“ Just in that place a narrow slit we make,  
Then other buds from *nobler* trees we take;  
Inserted thus, the wounded rind we close,  
And so the briar brings forth a *better* rose.”

VIRGIL (*adapted*).

Budding is really a variety of grafting, but the method is quite different, and, unlike proper grafting, it is done when the sap is flowing freely. One bud only—instead of several as in proper grafting—is detached from the “nobler tree” for insertion in the wild stock, except for “standard” roses, when three or four buds are inserted, one in each of several

## *Propagation*

shoots on the same stock. The young tree is then built up from the growth produced from the inserted bud, and any growths from the stock below the bud are removed as they arise.

For "standards" the buds are inserted at a point several feet above the ground, but for dwarf trees a single bud is inserted quite near the ground level on the north side of each young stock. (See diagrams, Figs. 22 and 20 respectively.)

The buds are more likely to "take" when they are inserted in young green shoots of the current year's growth.

A sharp knife is most essential, and a proper budding-knife with a flattened end to the bone handle can be obtained from most ironmongers, but, failing this, an old tooth-brush handle filed down for the purpose and an ordinary penknife may be employed.

**THE OPERATION.**—In the bark of the selected stock an incision is made about an inch long and running lengthwise with the shoot. A second incision half an inch long, made at the upper end of the first, then forms the capital T shown in Fig. 22. The flattened end of the bone handle is then used to press the bark away from the wood on each side of the T-shaped incision.

A plump bud is then cut as quickly as possible from a young and well-ripened shoot of the variety which is to be propagated. (See diagram, Fig. 20.)

In cutting this bud the knife should go just through the bark and slightly into the wood, but not too deeply. The small piece of wood at the back of the detached bud should then be removed with the knife-blade and the thumb of the right hand.

## Propagation

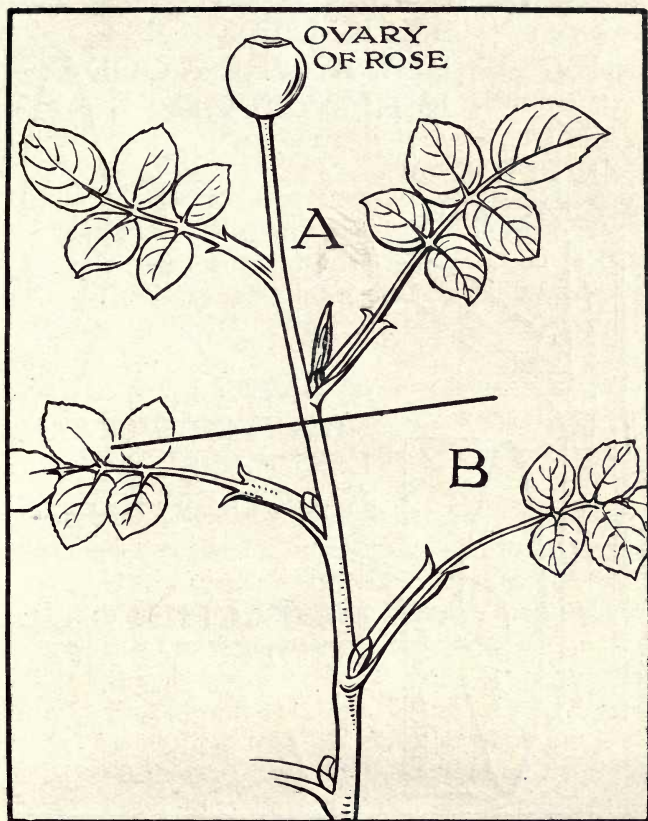


FIG. 20.—Budding.—Flowering Shoot of Rose.

A = Portion worthless for "budding." B = Well-ripened portion with plump buds just ready for "budding." Thorns removed.

This is done to expose as much as possible of the cambium layer of cells.

Next, holding the bud in the right hand and the budding-knife in the left, insert the bud in the slot



## Propagation

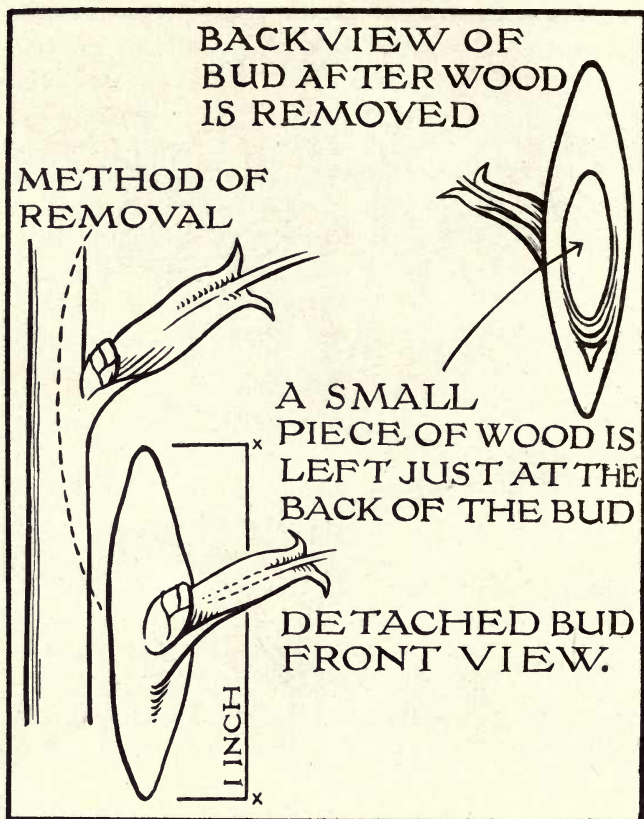


FIG. 21.—Portion enlarged to show how the bud is removed. Front and back view of bud after wood is removed also shown.

previously made in the stock, using the knife-handle to open the bark if necessary. If care is taken when cutting out the bud to make it a little shorter than the upright of the T, the whole of the bud can be

## *Propagation*

accommodated in the slot, but if the bud-shield is too long the piece which protrudes must be cut off.

Raffia or worsted is used to tie up the wound after the bud is inserted, care being taken to leave a small opening where the bud just shows in the axil of the leaf stalk.

The tie should be loosened about a month after the operation to allow the shoot to swell naturally.

A lady pupil once entered this direction in her note-book : " A month after the ceremony the knot should be untied." This referred to Budding, of course.

WHEN TO BUD.—Standard roses budded in June make a good deal of growth which has time to ripen before winter, then, in the following year the " heads " are as big as the average two-year-old.

Opinions differ as to the best time for budding. Some people start in June, others like to leave the operation till August so that the buds remain dormant all winter, and the majority of gardeners choose the middle of the budding period. In the latter case many of the buds make weak growth late in the season, and this young wood may be destroyed by frost later on. On the whole the best plan is, I think, to spread the operation over the whole period, roughly from mid-June to mid-August when the weather allows, and when buds are procurable. We do not then have " all our eggs in one basket."

WATERING.—In districts which are not favoured with summer rains, the stocks should be well watered before budding is commenced. A thorough soaking with plain water every day and for about three days previous to budding is often necessary in dry weather.

## Propagation

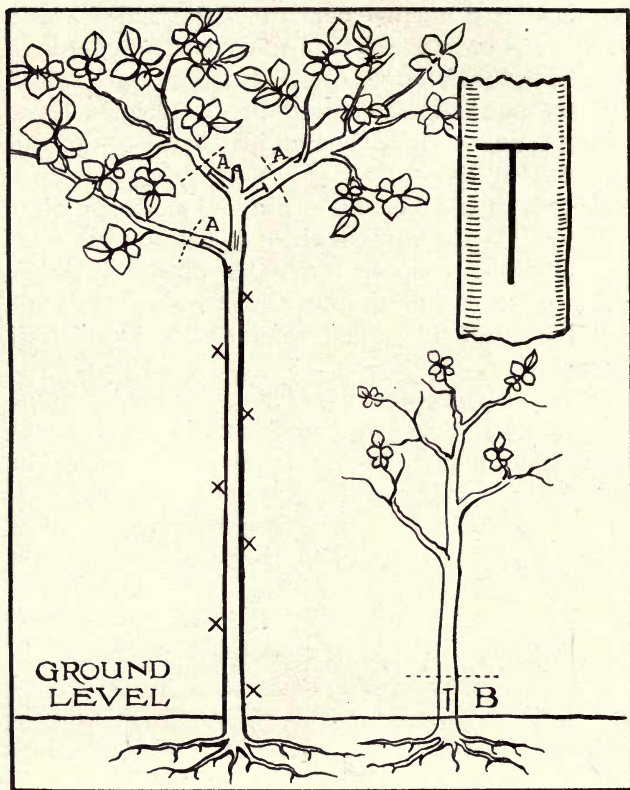


FIG. 22.—Budding.

A. Where to make the T-shaped incision for standard. Briar buds have been rubbed off earlier at places marked X. The dotted lines show where to cut away the stock when the bud begins to shoot. B. Where to insert the bud for bushes, etc.

**SUBSEQUENT TREATMENT.**—When the inserted bud has developed into a small shoot, the branch of the stock is cut away at a point just beyond the new growth.



## *Propagation*

WHAT TO BUD.—Apples, pears, plums, peaches and cherries, as well as roses, are all propagated by budding, but some knifemen prefer grafting for apples and pears. It is sometimes possible when a graft fails, to bud one of the young shoots which arise later on from the stock.

STOCKS.—Briar stocks are best for roses. Straight young stems from 4 feet to 8 feet in length may be obtained from the hedgerows in rural districts for standard roses, and stocks for rose bushes may be raised from briar cuttings or briar seedlings.

Stocks for fruit trees will be the same as for grafting.

### OTHER METHODS OF PROPAGATION.

I. BY CUTTINGS.—Early Autumn is the time to take cuttings of gooseberries, of red, black, and white currants, and also of roses.

Well-ripened shoots of the current year's wood should be selected, and the cuttings should be about 9 or 10 inches in length when prepared and ready for insertion in the soil.

The unripe tips of the shoots are first cut away, and then the base of the shoot is cut back. A sharp knife must be used, and each cut is made close to a bud as shown in Fig. 23.

The whole of the lower half of the cutting is to go beneath the soil and the buds on this lower portion must be removed when it is intended that the plants should not produce suckers.

Gooseberries, red currants, and white currants are usually grown with a distinct stem, and for this kind of bush only four or five buds will be left on the upper half of the cutting. (See Fig. 24.)

## Propagation

Black currants and roses are treated differently, *all* the buds being left on the cuttings (see Fig. 25), for the suckers on these plants will always give the best results.

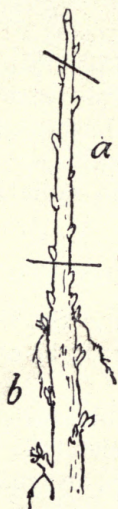


FIG. 23.

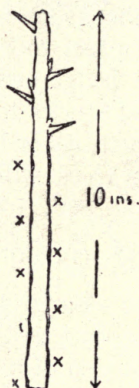


FIG. 24.



FIG. 25.

FIG. 23.—*a*, Wood of current year's growth, showing how to take a cutting; *b*, two-year-old wood. FIG. 24.—A prepared gooseberry cutting. Thorns and buds removed from places marked X. The buds are removed from the lower part of red currants and white currants also. FIG. 25.—A prepared black currant cutting. Rose cuttings are also prepared in this manner.

Thorns, if present, are removed from cuttings.

The young shoots may be taken from the bushes, tied in bundles, and plunged in the soil with the cut ends downwards until required. The cuttings

## *Propagation*

may then be prepared indoors when the weather is too wet for outdoor work.

After the cuttings are prepared they may again be tied in bundles and plunged in the soil until the cutting bed is ready.

The best place for this cutting bed is the north side of a wall or the shady side of a fence. A line should be stretched across the bed and a small trench taken out with a spade to a depth of about 4 inches. The cuttings are then placed about 3 or 4 inches apart along the line against the straight side of the trench. If the soil is of a heavy nature it is a good plan to fill the lower half of the trench with sand or road-grit, but on a sandy soil this is not necessary, and in that case the soil which was taken out will simply be put back again. The soil must be made firm by treading after the trench is filled, and this treading should be repeated during the winter, especially after frosty weather.

The main points to remember are :—

- a.* Select ripe shoots.
- b.* See that the knife is sharp.
- c.* Always cut close to a bud.
- d.* Quite 4 inches of the cutting must be below the ground level.

2. BY LAYERS.—The cuttings from certain plants will not readily produce rootlets, and in such cases layering is practised.

In this method of propagation the young shoots are bent downwards and partly buried in the soil, being thus induced to produce rootlets whilst still attached to the parent plants.

Sometimes a “ tongue ” is made in the shoot to be layered, as in the case of carnations (see Fig. 27), but



## Propagation

many kinds of plants may be layered without tonguing. The layered shoot is held down

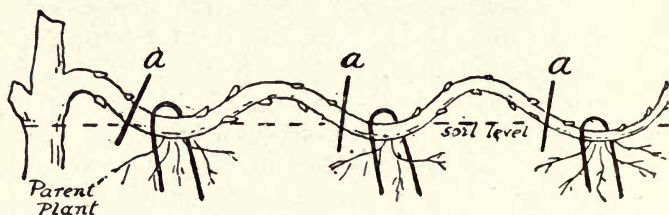


FIG. 26.—Pegs may be made of galvanised wire. *a*, Where to sever the layers when rooted.

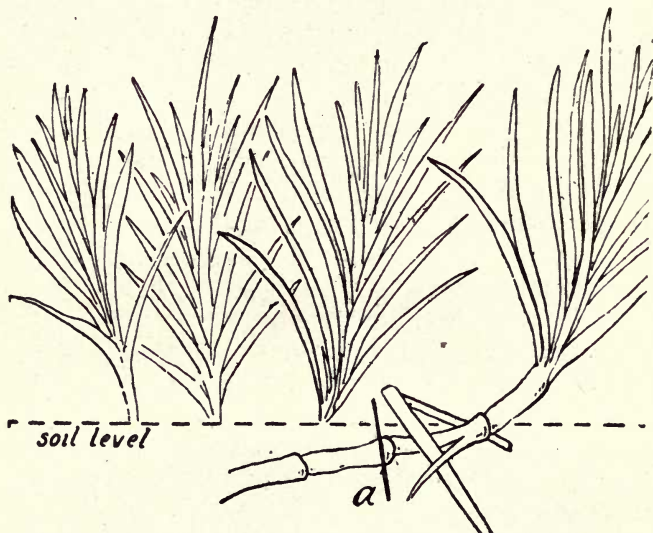


FIG. 27.—A layered carnation shoot. Note how the peg is passed through the tongue to keep it open.

and kept in position by means of a peg, as shown in Fig. 27, and this peg may be made of galvanised wire, or cut from hazel twigs, etc.

The young branches of many kinds of shrubs

## Propagation

are usually twisted before they are pegged down, and the twist is made as near to the parent plant as

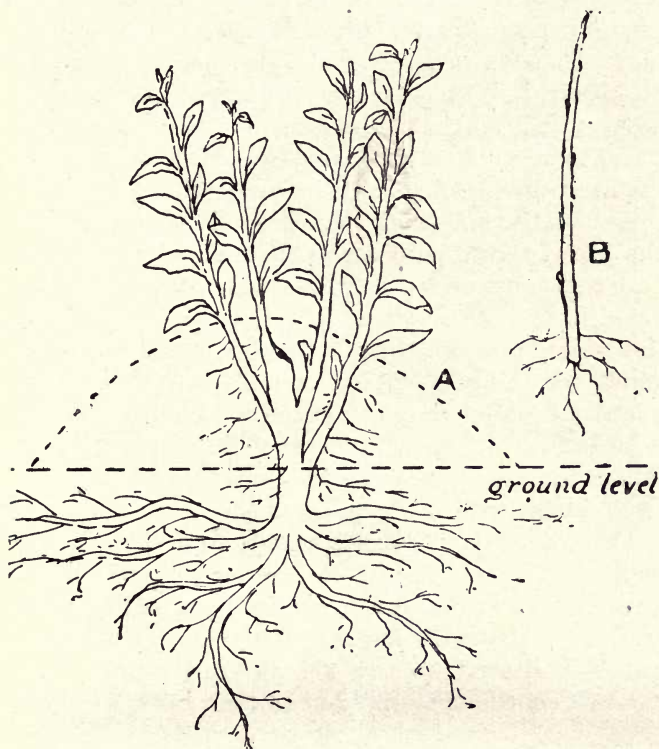


FIG. 28.—*A* broad-leaved English Paradise apple stock, cut back to produce layers. The curved dotted line *A* indicates the mound of soil which is gradually built up around the young shoots as they develop. *B*. A rooted layer severed from the "stool" in October ready for transplanting.

possible ; this is done to check the flow of the sap, and it hastens the production of rootlets. Certain trailing plants, such as clematis, are often layered

## *Propagation*

by what is sometimes called the "serpentine" method—*i.e.*, the young shoot is pegged down at more than one place, so as to form a number of plants instead of one as in single layering. (See Fig. 26.) This resembles Nature's method of layering strawberries. The best time for layering is, in most cases, just after the plants have finished flowering.

When a number of young fruit tree stocks are required for grafting and budding, these may be raised in the following manner. Young plants of the broad-leaved paradise apple, quince (for pears), and the common plum (for stone fruits) are procured from a nurseryman, planted 3 feet apart on the fruit plot some time in October, and allowed to stand for about eighteen months; then in the month of March they are cut down to within 4 or 5 inches of the ground-level. This cutting back causes the stock to send out several young shoots, around which the soil is piled as shown in Fig. 28.

The rooted layers are severed from the parent plant in the following October and planted in a nursery bed, to be used later on for budding and grafting. The old "stool"—as the parent plant is called—will send up new shoots yearly, thus providing a continuous supply of stocks.

### STRAWBERRIES.

Strawberries will grow like weeds on suitable soil, but when the land is unsuitable they are somewhat difficult to grow. Very heavy clay soils are most unsuitable and the best soil is a moist loam overlying a gravelly, or other well-drained subsoil. The plants are intolerant of excessive water in winter, but they require a copious supply in the growing season.



## Propagation

New beds should be made in July if possible, and when this is done the plants may be allowed to bear fruit in the following year, but if planted in October the first year's blossom should be picked off. The land must be well manured with good dung and made very firm before planting. Strong young

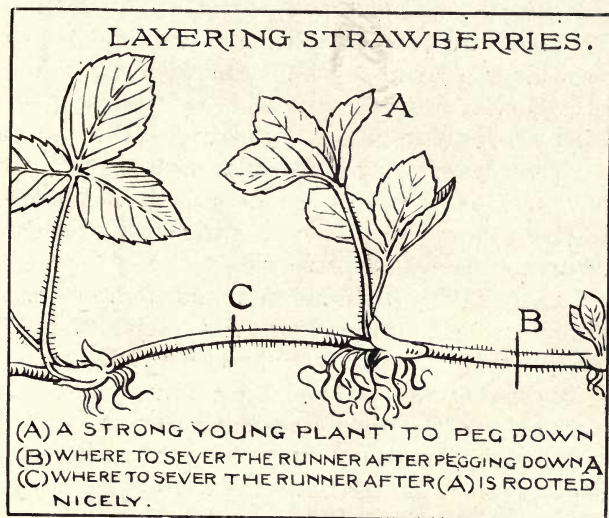


FIG. 29.

runners should be pegged down into small pieces of turf which are set into the ground near the parent plants for this purpose. These turf squares may be about two or three inches wide and they are inserted—grass downwards—with a trowel. Runners prepared thus may be easily transplanted, even during dry weather. The rows should be  $2\frac{1}{2}$  feet apart and the plants just 12 inches apart in the row. Runners should be removed as soon as they show if they are not required for furnishing new beds.

## *Propagation*

Mulch the plants with very long, strawy manure in spring ; then the subsequent rains will wash the soluble part of the manure into the ground, leaving the straw sufficiently clean to support the fruit.

A Selection of Varieties to form a succession, *i.e.*, to provide fruit from June to October :—

“KING GEORGE V.” (LAXTON). A seedling from Louis Gauthier × Royal Sovereign, and it ripens a week earlier than the latter. Forces well. Heavy Cropper.

“ROYAL SOVEREIGN.” Similar to the above but ripens later. A very popular sort.

“THE EARL.” May be described as Vicountess H. de Thurz, very much improved. Excellent flavour and useful for preserving.

“LAXTONIAN.” A grand main-crop variety and an improvement on the older “Sir Joseph Paxton.” Retains its colour after picking and travels well.

“BRITISH QUEEN.” The finest flavoured of all strawberries. Requires good cultivation.

“GIVONS’ LATE PROLIFIC. Very vigorous and free-cropping. Better than “Waterloo.”

LAXTON’S LATEST. Better grower than “Latest of All.” Does well on all soils. Large roundish fruit of dark colour.

PERPETUALS :—“WHITE PERPETUAL.” Louis Gauthier × St. Antoine. Fruits till stopped by frost.

“EVERBEARING ” (LAXTON). Large fruited red perpetual. Fruits continuously from June to November.

## CHAPTER VI.

### *Pests and Diseases of Fruit Trees.*

THE old-fashioned gardener is, even now, quite convinced that all plant diseases are inevitable and incurable. This type of gardener merely shrugs his shoulders and remarks, "Oh! It's the blight," when disease of any kind manifests itself. He does not trouble to discover the cause of the disease, and he either pulls up the plants which are attacked, and casts them on the rubbish heap, or else he merely goes his way and allows the crop to be destroyed.

Although there are still some plant diseases for which there are no known remedies, it is a fact that such diseases are under the close observation of some of our foremost scientists, and it is quite likely that the proper remedies may be discovered at any moment; but with respect to the majority of plant diseases, the records of world-wide experiments prove that crops may be saved and harvested in good condition, in spite of diseases, if proper precautions are taken.

The spread of horticultural education is gradually sweeping away the ignorance and apathy of the people on matters of this kind, and a hopeful sign is the fact that the average schoolboy can now distinguish between the damage caused by insects and that caused by fungus diseases, and he will also be able to give the common name of the pest instead of using the indefinite term "blight," which was



## *Pests and Diseases*

once used by the average man to cover all kinds of plant pests and diseases. The leaflets issued by the Board of Agriculture have been the means of spreading much useful information on this matter, and gardeners will find that every common plant disease is described and the proper treatment set out in these leaflets.

### HOW TO CLASSIFY FOR TREATMENT.

*The figures in brackets after the name of the pest denote the number of the leaflet dealing with the pest. Single copies may be obtained free of charge and post free from the Secretary, The Board of Agriculture 3, St. James' Square, London, S.W.*

PESTS WHICH WORK ABOVE GROUND, living in most cases on the plants themselves, may be divided for treatment into four groups, viz. :—

(a) Sucking insects, such as the apple sucker (16), aphides (104 and 68), and scale insects (107 and 210). These insects live on the sap of plants, first piercing the plant tissues and then drawing away the sap. Spraying with fluids, which are usually called "contact spraying mixtures," is the proper method for ridding plants of such pests. Paraffin, emulsified with soft soap and water, makes a very cheap and useful insecticide for summer use, and the soap also cleanses the leaves from the excrement of aphides. The plants may be damaged by this wash unless the emulsion is carefully made; the directions in the Appendix must therefore be carefully followed. (See page 76.)

Paraffin emulsion is also used to prevent celery flies (35), onion flies (31), and carrot flies (38) from depositing their eggs on the crops, and full particu-

## Pests and Diseases

lars of the treatment may be obtained from the leaflets.

Quassia chips and nicotine are both used with soft soap as "contact" washes, and there is no doubt that nicotine is by far the best and safest poison for

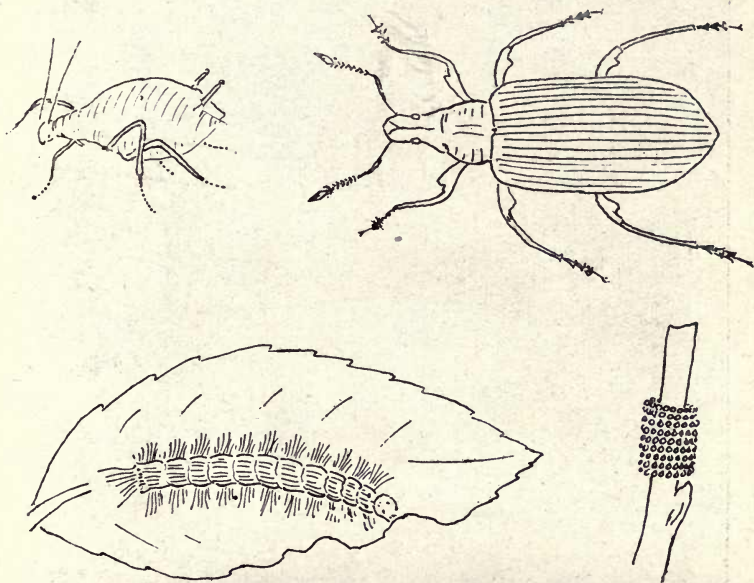


FIG. 30.—The Green Fly (*Aphis*) or Plant Louse (enlarged): the Glaucus Leaf Weevil (enlarged), and Caterpillar and Egg-band (on young shoot of apple) of lackey moth.

this purpose, but it is somewhat expensive at present and we must hope that tobacco will some day be grown in this country on a large scale, so that it may be used as an insecticide. (See Appendix II.)

Various scale insects attack certain fruit trees and bushes, and caustic soda is used for these, sometimes together with paraffin, in winter time.

# Pests and Diseases

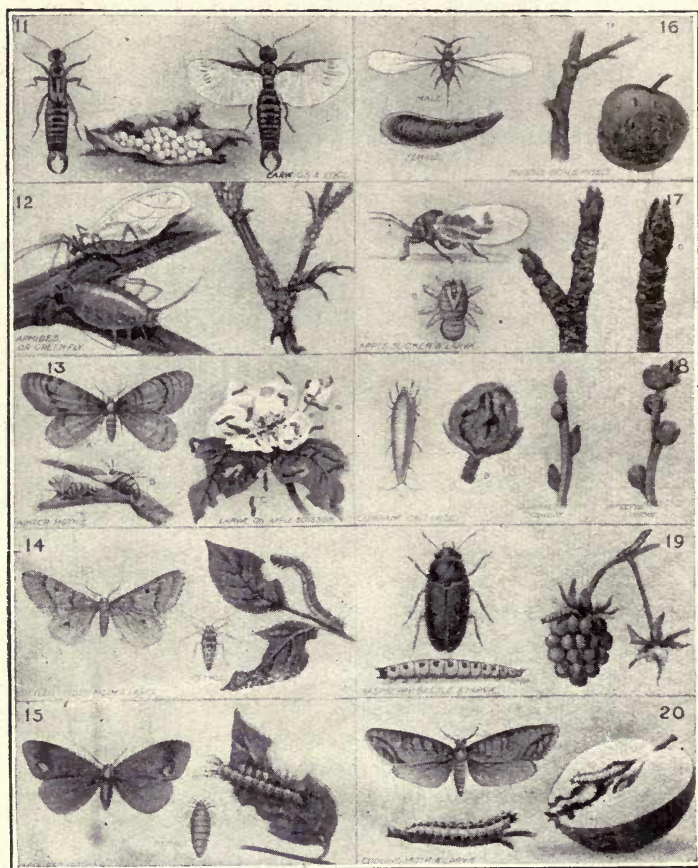


FIG. 31.—11. Earwigs and Eggs. 12. Aphides or Green Fly. 13. Winter Moths (male and female) and Larvæ on Apple Blossom. 14. Motiled Umber Moth (male and female) and Larva. 15. Vapourer Moths (male and female) and Larvæ. 16. Mussel Scale Insect (male and female). 17. Apple Sucker and Larvæ. 18. Currant Gall Mite (also normal and infected shoots). 19. Raspberry Beetle and Larvæ. 20. Codling Moth and Larvæ.



## *Pests and Diseases*

Contact washes must be applied with special syringes or machines which are capable of conveying the wash to the plants with great force, and it will be found that such washes are only effective when applied in this manner. The sticky substance which exudes from aphides renders them almost impervious to a light spraying, but it is a fact that the soft body of an aphid may be smashed by a jet of plain water applied with force behind it.

(b) Biting insects, such as leaf-eating caterpillars. In this case a poisonous wash must be used, and force is not necessary ; in fact, the wash should be applied in a fine condition as lightly as possible, so that it remains on the leaves. Arsenate of lead, Paris green, and London purple are all used for the caterpillars of the Winter Moth (4), Lackey Moth (69), and similar pests. The first-named gives good results.

Of some species in this group the female moths are wingless, and, as they must climb the trees to deposit their eggs, they may be trapped by means of grease bands placed around the tree trunks. (See page 44.)

(c) Weevils such as vine, plum, hop, and raspberry weevils (2) are often very troublesome and, when numerous, they are not easily got rid of. Trapping is practically the only remedy in this case. Tarred boards are used at night time for these weevils. For Apple Blossom Weevil see B. of A. Leaflet 15. Earwigs must also be included in this section, for these insects can only be kept in check by means of traps, such as the simple device which is adopted by dahlia growers, who place a small flower-pot containing hay upside down on the top of the stakes which support the plants.

(d) BORING INSECTS.—The Pith Moth (90), which

# Pests and Diseases

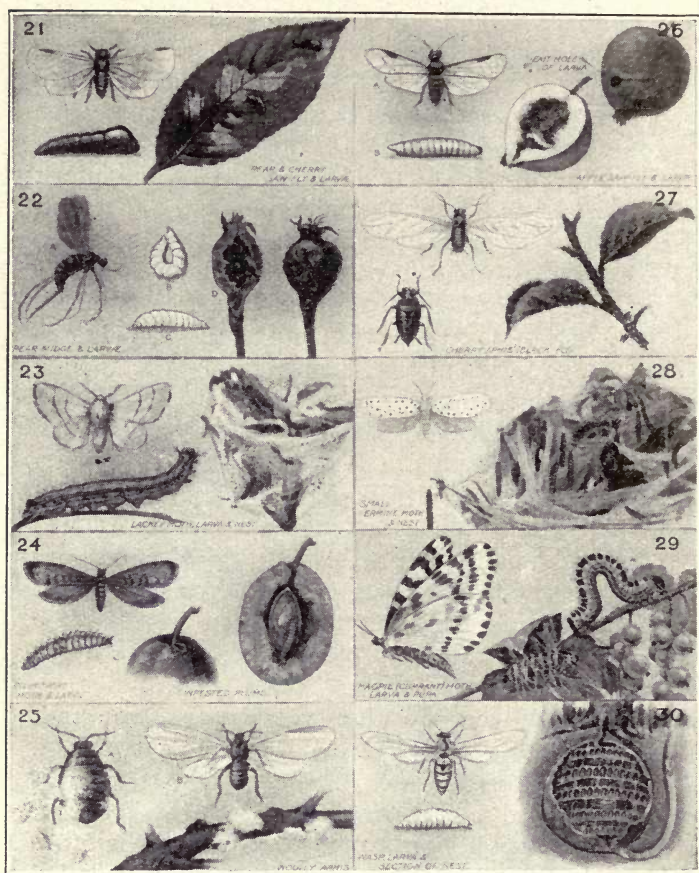


FIG. 32.—21. Pear and Cherry Saw-Fly and Larvæ. 22. Pear Midge and Larvæ. 23. Lackey Moth, Larva and Nest. 24. Plum Fruit Moth and Larvæ (also infested Plums). 25. Woolly Aphis and infected branch. 26. Apple Saw-Fly and Larvæ (also infected Apple showing exit hole of Larva). 27. Cherry Aphid (Black Fly). 28. Small Ermine Moth and Nest. 29. Magpie (Currant Moth), Larva and Pupa. 30. Wasp, Larva and Section of Nest.

## *Pests and Diseases*

attacks apple trees, the Shoot and Fruit Moth of black currants (123), the Wood Leopard Moth (60), and the Black Currant Mite are the most difficult to eradicate of all the pests in this group. Whilst they are living inside the plant the only way to destroy them is to cut off and burn the part attacked ; but in one or two cases, currant mite especially, the insects are known to emerge from their hiding-places at a certain stage in their life-history, they may then be destroyed by contact washes or poisonous washes, or sometimes by fumigation with hydrocyanic acid gas.

### FUNGUS DISEASES.

The skin diseases of plants, such as the true mildews and rusts, are not usually so difficult to deal with as the diseases of which *Phytophthora infestans* may be taken as the type. It is true that the mildews do after a time extend down into the inner tissues of the leaves, etc., but if they are combated in the earlier stages of the attack such diseases may be eradicated.

Sulphur in one of its forms is generally employed as a remedy for mildews and rusts. "Flowers of Sulphur" was at one time considered to be a very effective remedy, and it was dusted over the plants by means of a small machine to which bellows were attached. More recently "liver of sulphur" (potassium sulphide) has been employed and many tons of this must have been used in spraying the hop-gardens. Liver of sulphur is used at the rate of  $\frac{1}{2}$  ounce to 1 gallon of water or in certain cases 1 ounce to every 3 gallons of water. It should be used, regularly, say once each week, until the disease is



## *Pests and Diseases*

checked, and it should be freshly mixed for each time.

Lime-sulphur washes are also used to check mildew on plants. A self-boiled lime-sulphur wash is made in the following manner. Three pounds of freshly burnt quicklime is placed in a wooden tub and about  $\frac{1}{2}$  gallon of water is poured over it; 2 lbs. of flowers of sulphur is then added and next about  $\frac{1}{2}$  gallon of boiling water. The mixture boils, bubbles and splashes for some time, and the tub should be covered with a piece of sacking, but the covering must be removed occasionally to allow the mixture to be stirred. At the end of about fifteen minutes the boiling will cease and then the wash is made up to 10 gallons with extra water.

Before using, the lime-sulphur wash should be strained through coarse sacking or a fine-meshed sieve to remove the grit, etc., but the sulphur and fine lime should all pass through.

Bordeaux and Burgundy mixtures at half strength (see Board of Agriculture leaflet No. 131) are also used for some of these external diseases, notably for apple and pear scab, but there is a risk of scorching the foliage and care should be taken to follow the directions which are given in the leaflet.

American Gooseberry Mildew (Leaflet No. 195) is not easily stamped out—but it may be noted that some varieties of gooseberries are more resistant to attack than others.

### INCURABLE DISEASES.

There are one or two fungus pests for which no effective remedies have been found. Fruit trees suffering from a severe attack of the canker fungus

## *Pests and Diseases*

(*Nectria ditissima*, Leaflet No. 56) may be said to be beyond a cure, and the same is true with respect to Silver Leaf of Fruit Trees. (See Fig. 16.) The destruction by fire of all dead wood and treating the wounds with tar will undoubtedly check both diseases, but after a time the fungus breaks out again in other places on the tree. Scions for grafting should not be taken from such trees, for, although the scions may appear to be healthy, the diseases will sooner or later break out on the grafted trees.

### HOW TO AVOID MANY TROUBLESOME PLANT PESTS.

It is a curious fact that certain varieties of fruits, flowers, and vegetables are more or less immune from the attack of many pests and diseases, and in this connection it is most important that careful observation should be made in the fruit garden and records should be kept so that the susceptible varieties may be detected and eventually discarded. Very little published information on this matter is available at present and it is desirable that authentic cases should be reported to the Press and to the Board of Agriculture.

Any check to the growth, such as that caused by drought, will render the plants more liable to attack and steps should be taken to prevent checks of this kind.

Stimulating manures, such as sulphate of ammonia and soot, if applied in small quantities, will be very useful in helping the plants to recover from checks caused by bad weather. (See also advice on MANURES AND MANURING in "The Kingsway Allotment Book," Evans Bros., Ltd.).

# APPENDIX I.

## HOW AND WHEN TO USE SPRAYING MACHINES.

The Knapsack Spraying Machines which were purchased at the instance of the Food Production Department of the Board of Agriculture can be used for many purposes other than the prevention of potato disease. In 1917 nearly 8,000 machines were supplied for the use of allotment-holders, and those who have charge of these machines would do well to see that they are kept in good order so that they may be available if required for use against any of the under-mentioned pests and diseases.

The numbers in brackets after the names of the diseases denote the leaflets which are published by the Board of Agriculture; these leaflets may be obtained free of charge and post free from the Board at 3, St. James' Square, London, S.W. 1.

### (I) APHIDES OR PLANT-LICE (104).

<i>Name of Pest.</i>	<i>Plant attacked.</i>	<i>Remedies.</i>
*Permanent apple aphid	Apple.	(1) Nicotine and soap wash.
*Blossom and stem apple aphid.	"	(2) Soap and quassia wash, or
*Rosy apple aphid	"	(3) Weak paraffin emulsion applied in the early part of the year, and
*Cherry black fly	Cherry and Peach.	(4) Strong paraffin emulsion applied in the autumn. See Appendix II.
*Currant blister-leaf aphid (68).	Currants	
*Currant leaf and shoot aphid (68).	"	
*Peach aphid	Peach	
*Pear curling aphid	Pear	
*Leaf curling aphid	Plums	
*Plum mealy aphid (104)	"	
*Hop-damson aphid (88)	Damson and hops.	
*Gooseberry aphid . . .	Gooseberry	
Bean aphid (104) . . .	Beans, furze, etc.	
Cabbage aphid (104) . . .	Cabbages, etc.	
Rose aphides (104). . .	Roses.	

\* Professor F. V. Theobald, of Wye, strongly recommends the autumnal spraying for these pests. A strong paraffin wash may be used after the fruit is picked, for it does not matter if the leaves are damaged at that time of year.



## *Appendix I.*

### (2) SCALE INSECTS, BARK LICE AND WOOLLY APHIS (AMERICAN BLIGHT) (70).

<i>Name of Pest.</i>	<i>Plants attacked.</i>	<i>Remedies.</i>
Mussel scale (107)	Apple and black currant.	(1) Caustic alkali wash (2) Woburn wash (70). (3) Paraffin emulsions, or
Brown scale (223)	Plum, currants and gooseberry	(4) Lime-sulphur.* Washes, applied in winter.
White woolly currant scale	Currants and gooseberry.	
Woolly aphid (34)	Apple and pear.	
Oyster-shell bark scale (210)	Apple and plum.	

Winter washes which contain caustic soda will also remove moss, green-mould and lichens from the trees, thus doing away with the hiding places and breeding places of many insect pests.

### (3) LEAF-EATING CATERPILLARS.

<i>Name of Pest.</i>	<i>Plants attacked.</i>	<i>Remedies (POISON).</i>
Codlin moth (30).	Apple.	Arsenate of lead, Paris green, or London purple washes sprayed on the trees in leaf.
Winter moth (4) and similar pests.	Apple and other fruit trees.	

### (4) GRUBS ATTACKING GARDEN VEGETABLES.

<i>Name of Pest.</i>	<i>Plants attacked.</i>	<i>Remedies.</i>
Onion fly grubs (31)	Onions.	Paraffin emulsion applied as a preventive in spring and summer.
Carrot fly grubs (38)	Carrots.	
Celery fly grubs (35)	Celery and parsnips.	

### (5) MILDEWS, RUSTS, ETC.

Apple mildew (204), apple and pear scab (131), brown rot (86), peach leaf curl (120), American gooseberry mildew (195), onion mildew (178) may all be checked if the crop is sprayed at the right time and with the appropriate remedies.

\* The continuous use of spraying machines made of copper for lime-sulphur washes is not recommended, as these washes corrode the copper, but they may be used occasionally if they are afterwards thoroughly washed out and cleansed. Leaflet F. P. 116 on the care of Knapsack Spraying Machines may be obtained from the Food Production Department, 72, Victoria Street, London, S.W. 1.

## Appendix II.

### DIRECTIONS FOR PREPARING USEFUL WASHES, WITH THE FORMULÆ.

#### *Paraffin Emulsions.*

##### (1) FORMULA FOR AUTUMN USE.

Paraffin . . . . 1 gallon.  
Soft soap . . . . 1½ lbs.  
Water . . . . 10 gallons.

*Preparation.*—Dissolve the soap in 1 gallon of boiling water and add the paraffin whilst the water is still boiling. Churn or beat the emulsion together; make up to the full 10 gallons with rain water and churn again.

##### (2) FORMULA FOR SUMMER USE.

1 pint of milk.  
1 oz. carbolic soap.  
2 pints of paraffin.

An emulsion made in the same way as the one above, but this is in stock form and may be kept bottled up until required, when 20 pints of rain water must be added to each pint of stock emulsion.

(3) *Quassia and Soap Wash.*—Quassia, 1 lb.; soft soap, ½ lb.; water, 10 gallons. Place the quassia chips in a muslin bag and allow them to soak in *cold* water for twenty-four hours; dissolve the soap and mix with the quassia extra.

(4) *Tobacco and Soap Wash.*—Tobacco leaf, ½ lb.; soft soap, ½ lb.; water, 10 gallons.

*Preparation* as for quassia above, or scald the tobacco and make up at once if required in a hurry.

(5) *Nicotine Washes.*—Pure nicotine (poison) may be obtained, and for pests such as apple psylla it is a useful and deadly poison. Strength for spraying tender leaves and blossoms, 1 oz. in 8½ gallons of water.

(6) *Burgundy Mixture* (1 per cent.), 1 lb. powdered pure copper sulphate; 1¼ lbs. washing soda; water, 10 gallons.

*Preparation.*—Pour 1 gallon of water in a clean wooden tub, add the sulphate of copper, and when this has dissolved add the soda also dissolved in a separate gallon of water; then stir well and finally add the rest of the water. The soda may be dissolved in a bucket.

(7) *Woburn Winter Wash.*—Iron sulphate, ½ lb.; lime, ¼ lb.; caustic soda, 2 lbs.; paraffin, 5 pints; water, 10 gallons.

*Preparation.*—Put 9 gallons of water in a clean wooden tub and dissolve the iron sulphate in that. Make milk of lime by gradually slaking the lime, adding the water little by little; then strain the milk of lime into the solution of

## Appendix II.

iron sulphate ; next, add the paraffin and churn the mixture thoroughly. Add the caustic soda just before the wash is required for use.

(8) *Lime-Sulphur-Soda-Salt Winter Wash*. \*—Formula : Quicklime, 3 lbs. ; flowers of sulphur, 3 lbs. ; caustic soda, 1 lb. ; common salt, 3 lbs. ; water, 10 gallons.

*Preparation*.—Mix the soda and lime together in a bucket, slake with some hot water in which the sulphur has been incorporated, add the salt and make up to the full 10 gallons with water. The mixture is self-boiling provided that the lime is freshly burnt and not air-slaked.

(9) *Grafting Wax*.—Formula : Equal parts by weight of (a) Burgundy pitch, (b) tallow, and (c) kerosene wax.

Mix the ingredients and melt them together in an old saucepan over a moderate fire or on a gas ring. Warm the wax slightly when it is required for grafting. Candles of (a) and (b) may be used if these are unobtainable in the ordinary form. Note that grafting wax made with turpentine as an ingredient is almost certain to damage the grafts.

(10) *Winter Wash*.—To prevent birds from attacking fruit tree buds,  $\frac{1}{2}$  pint Jeyes' fluid in 4 gallons of water.

\* From Professor F. V. Theobald's "Insect Pests of Fruit."

## APPENDIX III.

### CALENDAR OF OPERATIONS IN THE FRUIT GARDEN.

**JANUARY**.—Clean up strawberry beds and lightly dig with a fork the land between the rows of plants. Prune apples and pears which were not done in the previous month. Attend to trees on walls and on fences, tying-in, or nailing up, the branches. Select scions for grafting and place them in a shady place. Spray gooseberries and any other trees if the buds are attacked by birds. See Appendix II., Formula (10).

**FEBRUARY**.—Finish nailing, or tying, trained trees on walls, etc. Prune trees which were planted in October previous. Spray all trees with a good winter-wash. See Appendix II.

**MARCH**.—Commence grafting. Protect with netting peaches and other trees which are coming into bloom on south walls. Make soil firm around cuttings of currants, etc.



## *Appendix III.*

APRIL.—Finish grafting. Attend to tree labels, and renew if necessary. Commence disbudding peaches at the end of this month.

MAY.—Examine blossom for pests and spray with nicotine washes if necessary. Examine grafts, remove suckers if any, and sever the raffia which binds the grafts. Continue disbudding, lay in the young growths and thin out the fruits of peaches.

JUNE.—Summer pruning commences. See Chapter III. Spray trees a second time with nicotine and soap wash if necessary. Commence budding, also fruit thinning.

JULY.—Continue budding and summer pruning. Thin out fruit. Collect and burn, or use, if possible, apples which drop to the ground. Make new strawberry beds if required. Protect cherries from birds. Summer prune red currants and white currants. Apply liquid manure to trees in bearing. See page 34.

AUGUST.—Gather ripe fruit when it is quite dry. Make wasp-traps by hanging jam jars partly filled with sweetened water to the branches of trees. Destroy wasp nests if any near at hand. If birds attack early apples provide water in drinking trough for them, also hang ripe sunflower heads to branches of trees. Cut out old raspberry canes immediately after gathering fruit. Continue summer pruning.

SEPTEMBER.—Continue to gather ripe fruit. Root-pruning should be done now, if at all. Fix bands to fruit trees attacked by winter moth caterpillars. Order new fruit trees if any required.

OCTOBER.—Plant all kinds of fruit trees during this month, if planting is to be done at all. Insert cuttings of currants and gooseberries. Gather and store keeping apples and pears if frosts appear, but leave these fruits on the trees as long as possible.

NOVEMBER.—Finish planting if this operation was delayed by wet weather in previous month. Dig carefully between fruit trees and apply a mulch. Cuttings may still be made and inserted.

DECEMBER.—Prune all trees which require it, except peaches and nectarines. Burn all dead wood and also any diseased wood. Examine fruit in store and remove any which show signs of decay.

# INDEX

APHIS, remedies for, 74

Apples—

- best varieties, 6
- budding, 57
- grafting new trees, 48
- liming, 39
- manuring, 35
- mulching, 34
- pruning, 19, 30
- regrafting old trees, 40
- sterility, 39

BANDING, grease, 44

Bearing—

- earliest age for, 1
- sterility, 38

Big bud disease, 42

Budding, 51

Bush trees, 2

CALENDAR of operations, 77

Caterpillars, remedies for, 76

Cherries—

- best varieties, 10
- budding, 57
- grafting, 48
- liming, 39
- pruning, 23
- regrafting, 41

Canker, 36, 40

Cordons, 3

Currants—

- big bud disease, 42
- cuttings, 57
- mulching, 34
- pruning, 24, 30

Cuttings, for propagation, 57

DEPTH to plant fruit trees, 16

Diseases—

- big bud of black currants, 42
- insect pests, 66
- prevention and check, 36
- spraying for, 36
- fungus, 71
- incurable, 72

Distance apart to plant, 13

ESPALIERS, 4

Established trees—

- manuring, 35
- mulching, 34
- regrafting, 40
- root pruning, 46
- spraying, 36

FUNGUS diseases, 36, 71

GOOSEBERRIES—

- cuttings, 57
- mildew, 26, 71
- running, 26

Grafting—

- crown grafting, 51
- old trees, 40
- reasons for, 47
- scions, 50
- stocks, 48
- time, 48
- wax, 41, 77
- whip-grafting, 51

HALF standards, 4

INSECT—

- friends, 17
- pests, 36, 66

Insecticides, 36, 74, 75

LAW for planting fruit trees, 1

Layering, 59

Lime, 39, 43

Limewash, 36

MANURES, 36, 43, 46, 73

Manures as mulches, 34

Mildew—

- prevention, 36
- remedies, 75

Moths, protection from, 44

Mulching fruit trees, 34

NECTARINES, grafting, 48

PEACHES—

- disbudding, 33
- budding, 57
- grafting, 48

# Index

## Pears—

best varieties, 8  
budding, 57  
grafting, 48  
liming, 39  
manuring, 35  
mulching, 34  
pruning, 19, 30  
regrafting old trees, 41  
sterility, 39

## Pests—

blight, 65  
insects, 66  
prevention and cure, 36  
remedies, 72, 74  
washes, 76

## Planting fruit trees—

best time, 12  
depth, 16  
distance apart, 13  
law for, 1  
making holes, 14  
preparing plot, 12  
staking, 14  
trimming roots, 15

## Plums—

best bush varieties, 9  
budding, 57  
grafting, 48  
liming, 39  
mulching, 34  
pruning, 22  
regrafting old trees, 40  
sterility, 39

## Pruning—

apples, 19  
cherries, 23  
currants, 24  
gooseberries, 26  
its objects, 18  
pears, 19  
plums, 22  
raspberries, 26  
root pruning (old trees), 32, 46  
summer pruning, 29  
winter pruning, 19, 31  
wounds and broken branches, 28, 32

## Pyramids, 22

## RASPBERRIES—

mulching, 34  
pruning, 28

## Regrafting old trees, 40

## Roots—

pruning, 32, 46  
trimming, 15

## Roses—

budding, 51, 53  
cuttings, 57  
stock for grafting, 57

## Rusts, remedies for, 75

## SCAB, prevention, 36

## Scions for grafting, 41, 50

## Silverleaf, 36, 38, 40, 71

## Soils, 2

## Spraying—

for diseases, 36  
machines, 74  
washes for, 76

## Staking, 14

## Standards, 2

## Sterility, causes of, 38, 40

## Stocks—

budding, 57  
grafting, 48  
roses, 52, 57  
small gardens, 1

## Strawberries, 63

## TIME to plant, 12

## Trees—

bush, 2  
cordon, 4  
espaliers, 4  
half standards, 4  
pyramids, 22  
standards, 22

## VARIETIES for small gardens—

apples (bush), 6  
cherries, 10  
pears (bush), 8  
" (cordon), 8  
plums (bush), 9

## WASHES—

formulæ, 76  
for black currants, 43  
for fungus diseases, 71  
for insect pests, 66, 74  
lime, 36







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